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IMPROVING PRE-SERVICE TEACHERS' PEDAGOGICAL STRATEGIES FOR INTEGRATING ICT IN TEACHING ACCOUNTING IN SENIOR HIGH SCHOOLS IN GHANA

BY

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Thesis submitted to the Department of Business and Social Sciences Education of the Faculty of Humanities and Social Science Education of the College of Education Studies, University of Cape Coast, in partial fulfilment of the requirements for the award of Doctor of Philosophy Degree in Curriculum and Teaching

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: ..... Date: 04/07/2020

Name: Bernard Fentim Darkwa

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

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ABSTRACT

The study focused on improving the teaching and learning of accounting with ICT (audio-visual materials) to promote interactivity in Senior High School (SHS) classrooms in Ghana. The research approach for the study was design-based research, using qualitative and quantitative methods. The design-based research approach consisted of four phases as conceive, build, test and reflection and documentation phases. Questionnaires, observations, semi-structured interviews, focus group discussions, student tests and designed lesson artefacts were the data sources employed in this study to track how the pre-service accounting teachers (PSATs) developed their pedagogical strategies to teach with ICT in an interactive manner. The study revealed the incorporation of audio-visual materials, the use of collaborative learning approach, activity-oriented and knowledge of technology as the features of ICT intervention to promote interactivity in SHS accounting classroom. The intervention proved to be effective in the development of the PSATs pedagogical strategies because it reflected all the four constructs (Active, Collaborative, Authentic and Intentional) for measuring the effectiveness of the ICT intervention as conceptualised in the study. The study concluded that the use of audio-visuals in senior high school accounting lessons will have implications on the availability of ICT resources and infrastructure such as availability of computers, projectors, internet connectivity and access to electricity, among others, in the school. This obviously will have financial implications on schools and stakeholders of education in the country. Lack of technology-based skills is one of the main reasons why teachers shy away from using technology as most of them seem to have gaps in their knowledge where ICT is concerned.

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KEYWORDS

Accounting

Design-based research

ICT (audio-visuals)

Interactive teaching

Pre-service teachers

Students

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DEDICATION

To my family.

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LIST OF ABBREVIATIONS

DBR	Design Based Research
G1TR1	Group 1 Teacher 1
G1TR2	Group 1 Teacher 2
G2TR1	Group 2 Teacher 2
G2TR1	Group 2 Teacher 1
G3TR1	Group 3 Teacher 1
G3TR2	Group 3 Teacher 2
G4TR1	Group 4 Teacher 1
G4TR2	Group 4 Teacher 2
ICT	Information Communication Technology
ICT-SAL	ICT – Supported Accounting Lesson
NIO	Number of Instructional Objectives
PSATs	Pre-Service Accounting Teachers
SHS	Senior High School
TPACK	Technological Pedagogical Content Knowledge

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CHAPTER ONE

INTRODUCTION

The study focused on the development of ICT intervention that can improve pre-service accounting teachers' pedagogical strategies for integrating audio-visual materials in teaching accounting in Senior High Schools in Ghana. Literature has revealed that traditional teaching approaches which are mostly teacher-centred have been used in the teaching of financial accounting in SHSs in Ghana. This, in a way, does not provides room for creativity on the part of accounting students. The study was deemed appropriate because studies have shown that ICT has the potential of changing the way teachers teach and also provides students with the platform to be creative in the teaching and learning environment. The pre-service accounting teachers who were involved in the study were exposed to constructivists' pedagogies in the development of the ICT intervention which equipped with the skills and strategies in teaching in an interactive manner.

Background to the Study

Accounting started as a subject of study in Ghana in the 1800s when the Wesleyan Missionary, Rev. Kemp, introduced the teaching of bookkeeping and commercial subjects in schools in Cape Coast and Accra (Antwi, 1992). Today, the subject is being taught in the second cycle and tertiary institutions including Senior High Schools (SHSs), Universities, and Professional Institutions such as the Institute of Chartered Accountants of Ghana (ICAG). In the SHSs, it is one of the elective subjects for business students. It is a requirement for students who study accounting at the SHSs in Ghana to pass to enable them further their education in the Universities since they do not have an opportunity of entering

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either nurses' training schools or colleges of education. Kwarteng (2013) was of the view that most students at the SHS level in Ghana have the perception that the accounting subject is not difficult to study compared to other subjects and therefore it will not be surprising for one to expect good performances from students who study accounting at SHS level in Ghana. However, the actual performance of accounting students in Ghana is different from what one would expect (Kwarteng, 2013).

Chief Examiners in accounting at the second cycle of education (West African Examination Council, 2016) have expressed concerns about accounting students' performance. One of the observations the Chief Examiners usually make has been the declining performance of students from year to year (WAEC, 2014, 2015, 2016). This implies that students' performance in accounting at SHS has not improved over the years. Rather, students' performance retrogresses from year to year. From the year 2000 up to 2015, the Chief Examiners in Accounting have raised many concerns with regard to students' performance in the subject at the West Africa Secondary School Certificate Examination (WASSCE). Attention has been focused on these concerns by the Chief Examiners and how they translate into students' and teachers' performance in the classroom and beyond. The reports from the Chief Examiners in Accounting indicated that the depth of students' knowledge in Accounting was shallow (WAEC, 2014, 2015, 2016).

Accounting students, according to the Chief Examiners' reports, showed weaknesses in the knowledge of the subject which limited their interpretation and translation of concepts into calculations. Some accounting students also had problems in applying the relevant accounting principles and lacked accuracy in

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computation. The report's further suggested that candidates were completely unfamiliar with various methods in accounting for business undertakings and transactions (WAEC, 2015). There was evidence of illogical presentation of material, suggesting a lack of confidence of candidates in the material they presented and ill-preparation for the examination. While some candidates were commended for the presentation of answers and neatness of work, the majority of candidates performed poorly because they failed to go beyond stating bullet points even when they were required to explain the points (Chief Examiners' Report, 2015). This poor performance by students could be as a result of how they were taught by their teachers in the classroom.

There are various methods for teaching accounting (Bonner, 1999). For example, reading text, problem-solving, interactive lectures, studying cases, short projects, presentations, simulation games and role-playing (Bonner, 1999). To Bonner, the choice of the teaching method is mainly influenced by the instructor's pedagogy and the students' goals. According to Cottel and Millis (1993), teaching methods in accounting are mostly of the lecture-type in a traditional classroom and teacher-centred. The teacher-centred approach to the teaching of accounting at SHSs in Ghana perhaps could be the reason why students' performance in accounting at the SHS level keeps dropping from year to year. This situation calls for a pragmatic approach to the teaching of accounting at SHSs that will enable students to become critical thinkers and more active in accounting lessons.

The nature of accounting requires teaching strategies that employ interactive approach and practically oriented lessons (Williams, 1994). There is a need for the refocus of the accounting curriculum towards the process of

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learning instead of just teaching students' answers. According to Williams (1994), accounting teachers are expected to train students to solve unstructured problems through hands-on activities (p. 208).

Recommendations by the Chief Examiners (WAEC, 2015 p. 16) to accounting teachers at SHS have been that "Candidates should be given the opportunity to practise a lot in what they learn by giving them a lot of assignments and discussing their specific problems with them". For accounting teachers to be able to achieve this objective, the focus of teaching accounting should shift from a teacher-centred to interactive teaching approach. Studies have shown that learning proceeds effectively when the learner is actively and meaningfully involved in the instructional process (Fortin & Legault, 2010; Johnson, Johnson & Smith, 2014). Thus, accounting teachers should aim at teaching the students "how to fish" instead of "fishing for them" (Kwarteng, 2013). This stance is taken following the observation of Awayiga, Onumah and Tsamenyi (2010) that immersing accounting students in the execution of practical questions stimulates their interest and skills in analysing similar transactions in unfamiliar settings. Learning by doing has the tendency of leaving everlasting imprints of the concepts learnt (Awayiga, et al., 2010).

As new concepts of learning have evolved, accounting teachers are expected to facilitate learning and make it meaningful to individual learners rather than just to provide knowledge and skills. Developments of innovative technologies have provided new possibilities to teaching professions, but at the same time, have placed more demands on teachers to learn how to use these new technologies in their teaching (Robinson & Tang, 2005). These arguments reiterate that teachers play very important roles in the teaching and learning

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process. Although students, school authorities, and educational planners are expected to effectively contribute their quota to education, students cannot be of much help to themselves without the teachers being very effective and efficient. An effective and efficient teacher has a wide-ranging repertoire of different teaching and learning models, strategies and techniques and knows how to create the right condition for learning (Hopkins 2002). According to Oyekan (2000), there is no one generally accepted method of teaching accounting and therefore accounting teachers are expected to use various pedagogical strategies in the teaching of accounting at the Senior High School.

According to Tamakloe, Atta and Amedahe (1996), pedagogical strategies are the processes which are adopted by both teachers and students to induce learning in a teaching-learning interaction. Pedagogies are also defined as the practical application of teaching principles based on the nature of the learner, the nature of the subject and the learning needs of the pupils/students (Usman, 2008). Teaching strategies used by teachers in the classroom, in most instances, determine the success and quality of students' learning. Today, a variety of ICT tools can facilitate not only the delivery of instruction but also the learning process itself.

Rosnaini and Mohd (2008) define ICT integration as the process of determining where and how technology fits in the teaching and learning scenario. This is an indication that the integration of ICT into the very idea of teaching and learning always places pedagogy over technology. Research indicates that ICT can change the way teachers teach and that it is especially useful in supporting more student-centred approaches to instruction and in developing higher-order skills and promoting collaborative activities (Haddad,

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2003). According to Majumdar (2002), understanding the changing role of teachers from instructors to facilitators, teacher-led instruction to learner-centred instruction is the key for successful implementation of pedagogy-technology integration for teacher development.

The major emphasis of ICT infusion in pedagogy should be such that it tends to improve learning, motivate and engage learners, promote collaboration, foster enquiry and exploration, and create a new learner-centred learning culture (Zhu, 2003). Studies have shown that ICT can help the learner to share learning resources and spaces, promote learner-centred and collaborative learning principles and enhance critical thinking, creative thinking and problem-solving skills (Allan, 2007; Fu, 2013; Koh, 2013). These arguments suggest that utilizing ICT to improve teaching and learning should be of utmost importance to teachers in performing their role as creators of pedagogical environments. In Ghana, pre-service accounting teachers (PSATs) are students-teachers in universities who are being trained to become professional accounting teachers. As part of their training, they are exposed to various pedagogical strategies in teaching accounting. Upon completion of their training, the PSATs go to SHSs in Ghana to teach accounting. But the question is, how can PSATs combine pedagogy and technology to obtain improved content in student learning?

Statement of the Problem

Traditional teaching methods have been used in teaching and learning of accounting since the advent of formal education in Ghana (Ayebi-Arthur, & Tenkorang, 2011). Accounting as a discipline, by its nature, calls for a minimum deviation from the rules of thumb that have been established to guide practice (Kwarteng, 2013). According to Kwarteng (2013), accounting teachers ensure

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strict adherence to the principles, standards and conventions of accounting. This, more or less, implies indoctrination and thus does not give room for creativity (Kwarteng, 2013). Hence, realist philosophy of teaching is usually used in accounting instructions where students are made to memorize and recite the concepts without having to question what they learn (Kwarteng, 2013). This implies that accounting instructions at the SHSs in Ghana are more teacher-centred for the fact that the teacher is considered a know-all and a repository of all knowledge and wisdom so as to instruct students through discipline of the mind to bring students to the knowledge of the onerous wisdom that the accounting teacher possesses retrospectively (Kwarteng, 2013). Agyei (2012) observed that the teacher-centred approach is the main teaching approach being adopted to train prospective teachers in Ghana. To appreciate the effect of the teacher-centred strategies on students' performance, it is important to assess the performance of students in accounting.

Table 1 shows the performance statistics of students in WASSCE financial accounting from 2012 to 2015. Grades A1-C6 represent pass for entry into the University, D7-E8 represent pass but not fit for entry into the University and F9 represents fail.

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Table 1: Performance Statistics of SHS Students in Financial Accounting (2012-2015)

Year	Total Number	A1-C6 Pass No. (%)	D7-E8 Weak No. (%)	F9 Fail No. (%)	Absent/Cancel No. (%)
2012	38,841	26,478 (68.2%)	7,918 (20.4%)	4,091 (10.5%)	354 (0.9%)
2013	86,063	45,785 (53.2%)	21,516 (25.0%)	17996 (20.9%)	602 (0.9%)
2014	46,653	26,550 (56.9%)	11,389 (24.4%)	8,093 (17.4%)	621 (1.3%)
2015	45,973	25,514 (55.5%)	10,429 (22.7%)	9,181 (20.0%)	839 (1.8%)

Source: WAEC (2012 – 2015)

The statistics show that, in 2012, 20.4% of candidates obtained grades D7 and E8 which are very weak passes because they are normally not considered for purposes of progression from the SHS to the tertiary institution. Meanwhile, 4,091 representing 10.5% of students obtained grade F9 in Financial Accounting during the same period. The situation worsened in 2013 when 17,996 (20.9%) of students obtained grade F9 in accounting. The situation was not any better in 2014 and 2015. There are possible factors that may account for the poor performance of these students. Philip (2000) was quick to indicate that the absence of factors such as qualified teachers, conducive classrooms, textbooks, and furniture, curriculum relevance, infrastructure, learning process

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(monitoring and evaluation) and adequate funding has the potency to contribute to such lapses in students' performance.

Accounting professionals have envisaged that accounting education has serious problems (Albrecht & Sack, 2000) and if serious changes are not made, accounting education will lose its relevance to schools, students, and the employers who might otherwise be interested in accounting students. Albrecht and Sack (2000) identified six major categories of perceived problems in accounting education as relating to accounting curriculum, its pedagogy, its ability to develop critical skills, application of technology to accounting, teacher development and motivation, planning of accounting programmes and administration of accounting departments. In fact, there are some developmental connections between these criticisms and the way pre-service accounting teachers (PSATs) are prepared from accounting teacher training institutions.

Accounting teacher education programmes are designed primarily to help PSATs develop a narrow research agenda, and to perpetuate the focus on detailed specialization which they carry into classrooms. This tradition has shaped PSATs to give accounting students the wrong impression of accounting and thus exposes students to the bookkeeping and rule-based orientation of accounting in senior high schools. Although information technology has been captured as a topic in the accounting curriculum, accounting teachers fail to integrate ICT in their delivery. The curriculum itself fails to present a detailed guide as to how teachers are to facilitate how technology is used in accounting. The content lacks a practical identity of the orientation that is required for students to internalise the right concepts and skills in the use of technology in

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accounting. Content has been reduced to discussions of computer hardware and software without a cogent application of technology to accounting.

The potentials of ICT, among others, enable students to be authentic in achieving their personal goals, develop critical thinking skills and actively interact with teaching and learning materials (Allan, 2007; Fu, 2013; Koh, 2013). In the last several decades, there has been a large-scale emergence and use of technology in every area of human activity, especially in the field of education. This has brought about a dramatic change in instructional methods for general education and particularly for teaching and learning (Sosin, Blecha, Agarwal, Bartlett, & Daniel, 2004). The terms instructional technology and technology with relevance to instruction include a wide range of media, hardware, and software such as audio and video equipment, graphics, images, animation, data transmission equipment for the delivery of content, and applications of knowledge to students in and out of classroom and for other applications of computer technology. Although few studies have addressed the effectiveness of technology in teaching (Hale, 2005) there are much more researchers and educators need to know about which technologies are appropriate for a variety of educational disciplines like Accounting.

In Ghana, however, limited studies have been conducted on the pedagogical approaches for integrating ICT into the teaching of accounting in SHSs in Ghana. Specific literature on factors that impact students' performance in accounting is scanty. Most of the available literature are studies undertaken in other countries and in other subject areas such as in Science, Mathematics and English Education (Baumert, Kunter, Blum, Brunner, Voss, Jordan, & Tsai, 2010; Kenney, Shoffner, & Norris, 2014). The few pieces of literature that were

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obtained on Accounting education in Ghana were the studies of Kwarteng (2014), Mordedzi and Mireku (2015) and Bosu 2016. Kwarteng (2014) researched on the implementation of the accounting curriculum in SHSs in Ghana, Mordedzi and Mireku's (2015) study looked at the learning styles of students in the study of Cost Accounting in a private SHS in Ghana whilst Bosu (2016) looked at teaching practices of accounting teachers in SHSs in Ghana.

It is obvious that the studies enumerated did not look at the potentials of ICT in improving the teaching and learning of accounting in SHSs in Ghana. It was observed through literature review that the design based research (DBR) approach have been the method mostly used in studies that involved the development of intervention for integrating ICT in teaching of other subjects such as Mathematics and Science. However, in Ghana, no study has been conducted in accounting education on integration of ICT in teaching at the SHSs using the DBR method. These issues leave gaps in the literature for researchers to make a conscious effort to fill.

Purpose of the Study

The study generally sought to explore how pre-service accounting teachers can improve their pedagogical strategies for integrating ICT (use of audio-visual materials) to enhance the teaching of accounting to make it more interactive. Specifically, the study determined:

1. the features of ICT intervention that fit the realities in the SHS's classroom and can prepare pre-service teachers in Ghana to teach in a manner that makes the teaching of accounting interactive.

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2. the effectiveness of the ICT intervention in developing pre-service accounting teachers' (PSATs) pedagogical strategies to improve teaching and learning of concepts in accounting.
3. how the improvements in teaching using ICT-supported pedagogical strategies be understood and or explained.
4. how the improvements in students' learning of concepts in accounting using ICT-supported pedagogies be understood and or explained.

Research Questions

In line with the purpose of the study, the following questions were formulated to guide the study:

1. what are the features of ICT intervention tha can be designed to fit the realities in the SHS classroom in Ghana in a manner that makes the teaching of accounting interactive?
2. how effective is the ICT intervention in developing PSATs pedagogical strategies to improve teaching and learning of concepts in accounting?
3. how can the improvements in teaching using ICT-supported pedagogical strategies be understood and or explained?
4. how can the improvements in students' learning of concepts in accounting using ICT-supported pedagogies can be understood and or explained?

Significance of the Study

The main purpose of this study was to develop ICT intervention that can improve pre-service accounting teachers' pedagogical strategies to enhance the teaching and learning of concepts, conventions, and principles, among others, in accounting in Ghana. The findings from this study would provide relevant

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information to key stakeholders in education. The study aimed at providing useful guidelines for the effective integration of ICT into the teaching of accounting at the SHS level. This will provide the opportunity for the government and institutions involved in training accounting teachers to obtain adequate information about what needs to be done to promote effective integration of ICT in teaching accounting in senior high schools in Ghana.

Again, it is believed that the findings of the study would provide guidance for accounting curriculum planners and designers such as the Ministry of Education (MoE) and the National Council for Curriculum and Assessment (NaCCA) to plan and design the senior high school accounting curriculum to incorporate the use of ICT. Similarly, the findings would provide the platform for planning professional development training and other capacity-building programmes for accounting teachers to update their pedagogical skills and knowledge. It would provide decision input to allow accounting teacher educators to modify their pedagogical approaches used in the training of accounting teachers. Finally, the study would contribute to the literature by augmenting the scanty literature on accounting education in Ghana with regard to pedagogical approaches for integrating ICT in teaching accounting in senior high schools.

Delimitation

In terms of coverage area, the study used only the PSATs in the University of Cape Coast. In terms of the scope of the topic, the study concentrated on the use of audio-visual materials in teaching accounting. This does not extend to the use of accounting software. The subject accounting, as used in the study, refers to financial accounting at the SHS level. SHS 1 and

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SHS 2 classes were used for the study because most of the topics, according to literature, accounting students had problems with were at the SHS1 and SHS 2.

Limitations

In this study, a case study strategy was employed using both quantitative (questionnaires, pre- and post-tests) and qualitative evidence (semi-structured interviews, focus group discussion and observation, researcher's logbook, lesson artefacts). Though each method adopted for data collection has its own inherent errors and limitations which cumulatively may affect results and conclusions drawn, the different approaches were complementary when triangulated; thereby improving confidence in the findings. The case study design allowed for only a limited number of participants (the use of eight PSATs in the development of the intervention) to be used in the current study. Thus, generalising the results to a larger population is not possible.

The study, however, adopted descriptive type of case study in order to make analytical generalisations that are important for the formulation of design guidelines. The iterative process, as afforded by the DBR, was upheld to ensure that explanations given in the study were "independent of any methodological biases" (Harder, 2012, p. 3). The study was context-bound in that, PSATs considered for the study were selected from only one higher education institution in Ghana (University of Cape Coast). This could limit the transfer of the study to other higher education institutions. The PSATs had accounting as their major teaching subject. This placed a limitation on the extent to which data, as well as outcomes of the study, could be applied to other business subjects such as management, economics, and costing.

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Definition of Terms

Accounting: Refers to financial accounting at the senior high school level.

Audio-visual: The use of videos, audios, pictures, and animations in teaching.

Pre-service teachers: Level 300 Bachelor of Education students.

Stakeholder: Parties who influence or are influenced by the activities and decisions of an educational enterprise.

Organisation of the Study

The study is organised into five main chapters. Chapter One deals with the introduction of the study which centred on the background to the study, statement of the problem, the purpose of the study, research questions, significance of the study, delimitation, and limitations of the study. Chapter Two presents a review of the theoretical and empirical literature on the integration of ICT into teaching, highlighting the conceptual framework for the study. Details of the method used in the investigation are presented in Chapter Three. This includes the research design employed, research approach (DBR), population, sample and sampling procedure, instrumentation, data collection, and data analysis procedures. Chapter Four presents the results of the data analysis. It also discusses the resulting findings to address the questions raised in Chapter One. The final chapter, Chapter Five, provides a summary of the key findings, conclusions, and recommendations.

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CHAPTER TWO

LITERATURE REVIEW

This section presents a combination of conceptual issues in teaching and the theoretical underpinnings of the study. It provides a broad knowledge base of the conceptual strands in integrating ICT into teaching by detailing the implications on teaching and learning. The areas of review include the concept of teaching, ICT in education, constructivism and pedagogical strategies. The rest of the review centre on instructional technology in accounting, TPACK framework, and design-based research. The review is done to justify how well the study is grounded in literature and the basis for some decisions taken in the course of the study.

Theoretical/Conceptual Review

The concept of teaching and learning

According to Hoyle (2011), "Teaching is engaging students, engineering an environment in which they learn." As cited in Bain, (2004, p. 49), it is simply the distribution of knowledge possessed by the teacher and transferred to the learner about a specific subject on a specific domain. It aims, according to Pascal and Paul (2011) "to extend the learning by identifying the current level of understanding of each learner and planning activities." Teaching is the process whereby a teacher imparts knowledge, skills, attitudes, and values to a learner or group of learners in a way that respects the intellectual integrity and capacity of the learners with the aim of changing the behaviour of the learner(s) (Frimpong, 1990). Teaching, therefore, is a process with distinct stages as well as several components that ensure effective completion of this process (Tamakloe, Atta & Amedahe 2005). This process is carried out in a context

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where the principal agents are the subject matter, the teacher and the students. According to Tamakloe et al. (2005), these three components or focal points form a triadic relationship. There is constant interaction among the teacher, the learner and the subject matter so as to achieve an effective teaching and learning process. The teacher is expected to have adequate knowledge of the subject matter as well as employ appropriate pedagogical strategies to enable him/her facilitate the teaching and learning process effectively.

According to Herod (2012, p. 6), "learning is the cognitive/physical/ affective acquisition and processing of skills/knowledge to varying depths, (where 'depth" refers to one's understanding of, ability to manipulate, apply, and/or communicate the skill/knowledge)." Learning is a process where students make meaning of new concepts by linking them to the current conceptual framework (Kruse, 2009). Kelly (2001) asserted that learning is an adaptive change in student's behaviour or belief. From constructivists' point of view, learning is self-regulated with promising avenues for students to discover and to interpret findings from such discoveries (Hendriks, Luyten, Scheerens, Sleagers and Steen, 2010). Wilson and Peterson (2006. p. 1) were of the view "that learning is a process of active construction; that learning is a social phenomenon, as well as individual experience; and that learner differences are resources, not obstacles'".

Students' active involvement in the learning process is an important attribute as Wilson and Peterson (2006) explained that constructivists share the view that students actively make meaning from the text they read, from interacting with their surroundings, and from sharing ideas with others. Felder (1993) explained that active students construct knowledge very well whenever

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they work in groups. The group work should not be limited to classroom works only but to out of classroom exercises as well. Kruse (2009) stressed that the fact that constructivists believed that students actively make meaning of concept does not mean that the role of teachers is insignificant. For instance, scientific knowledge cannot be acquired by instinct and that the teachers' intervention in the form of scaffolds (such as questions) to aid students' learning cannot be underestimated.

Information and Communication Technology (ICT) in Education

Integration of Information and Communication Technology (ICT) is high on the education reform agenda worldwide particularly in developed countries (Tilya, 2008). Often ICT is seen as an indispensable tool to fully participate in the knowledge society (Peeraer & Van Petegem, 2011). ICTs are therefore perceived to provide a window of opportunity for educational institutions and other organisations to harness and use technology to complement and support the teaching and learning process. Tilya (2008) indicated that ICT appears to have the potential to transform the nature of education: where and how learning takes place and the roles of students and teachers in the learning process. Naidoo (2003) presents three key points, or benefits of ICT: (1) ICT can result in improved learning; (2) ICT offers the greatest support to learners from disadvantaged backgrounds; and (3) it impacts the society in which the learners reside. Despite its potentials, a number of critiques on the use of ICT in education have emerged. Two particular observations serve to temper expectations: first, there has been a disappointingly slow uptake of ICT in education even though high investments have taken place in improving access to technologies and in improving the skills

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of teachers and learners; secondly, there hasn't been an educational revolution in teaching and learning (Selwyn, 2007).

There is a common belief that the use of ICTs in education contributes to more constructivist learning and an increase in activity and greater responsibility of students. This limits the role of the teacher in supporting, advising, and coaching students rather than merely transmitting knowledge (Bransford, Brown, & Cocking, 2000). The field of education has been affected by ICTs, which have undoubtedly affected teaching, learning and research (Yusuf, 2005). ICTs have the potential to accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change (Davis & Tearle, 1999; Lemke & Coughlin, 1998, cited by Yusuf, 2005).

The integration of information and communication technologies can help revitalize teachers and students. This can help to improve and develop the quality of education by providing curricular support in difficult subject areas. To achieve these objectives, teachers need to be involved in collaborative projects and the development of intervention change strategies, which would include teaching partnerships with ICT as a tool. According to Zhao and Cziko (2001), three conditions are necessary for teachers to introduce ICT into their classrooms: teachers should believe in the effectiveness of technology, teachers should believe that the use of technology will not cause any disturbances, and finally, teachers should believe that they have control over technology.

However, research studies show that most teachers do not make use of the potential of ICT to contribute to the quality of learning environments

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although they value this potential quite significantly (Smeets, 2005). Harris (2002) conducted case studies in three primary and three secondary schools, which focused on innovative pedagogical practices involving ICT. Harris (2002) concludes that the benefits of ICT will be gained "...when confident teachers are willing to explore new opportunities for changing their classroom practices by using ICT. As a consequence, the use of ICT will not only enhance learning environments but also prepare the next generation for future lives and careers (Wheeler, 2001). According to Smeets (2005), "the flexibility of time-space accounted for by the integration of ICT into teaching and learning processes contribute to increasing the interaction and reception of information. Such possibilities suggest changes in the communication models and the teaching and learning methods used by teachers, giving way to new scenarios which favour both individual and collaborative learning".

Contemporary learning theory is based on the notion that learning is an active process of constructing knowledge rather than acquiring knowledge and that instruction is the process by which this knowledge construction is supported rather than a process of knowledge transmission (Duffy & Cunningham, 1996). In this domain, learning is viewed as the construction of meaning rather than as the memorisation of facts (Lebow, 1993). Learning approaches using contemporary ICTs provide many opportunities for constructivist learning through their provision and support for resource-based, student-centred settings and by enabling learning to be related to context and to practice (Berge, 1998).

The integration of ICT into Ghana's educational system was formally introduced as part of educational reforms which began in September 2007 as part of the government's initiative to improve the quality of teaching and

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learning in the nation's schools. One major requirement of the 2007 educational reform was to ensure that all students in pre-tertiary institutions in Ghana acquire basic ICT literacy skills (including internet use) and apply these not only in their studies but also in a variety of ways in their everyday life activities (CRDD, 2007a, 2007b, & 2007c). UNESCO (2002) argues that the potential of ICT may not be optimized if there is no shift in the education paradigm. There is a rhetorical paradox in national ICT policy: on the one hand, ICT is conveyed as having beneficial effects on the educational system and contributing to successful competition in the global market; on the other hand, the driving force behind the use of ICT in educational practice should take its point of departure in pedagogy (Bryderup & Kowalski, 2002).

Studies have clearly indicated that Ghana like many other African countries lags behind the integration of ICT in teacher education. Important questions such as "What can teachers do with ICTs to promote the integration of technology in curriculum or to extend instructional methods?" and "What can teachers do with ICTs to improve students' outcomes?" still remain (Agyei, 2013). Hutchison and Reinking (2011) also observed that when teachers lack the required ICT-oriented knowledge, they seem to have difficulties in building on their existing pedagogical knowledge. For Ghana to be able to fully integrate ICT into teaching and learning, a situational analysis of the different contexts and challenges that exist within her educational institutions regarding ICT use is a necessary first step to explore (Agyei, 2013).

Integration of technology in education has increasingly become an important concern in education not only in developed countries but in developing countries as well. Tilya (2008) analyzed the development of

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technology in education policies in Sub-Saharan Africa. He found that the majority of Sub-Saharan Africa countries have a national policy on technology in education, including an implementation plan. Ghana is one of the Sub-Saharan African countries with national policy and implementation plan for technology in education. Ghana introduced ICT into the school curriculum in September 2007 following the recommendations of the Ghana Information and Communication Technology for Accelerated Development Policy document and the Anamuah-Mensah National Education Review Committee Report (2002). Both documents highlight the importance of integrating ICT into the curriculum at all levels.

Instructional Technology in Accounting Education

Technology in the context of education can mean two things: technology as a tool for learning and technology as a process to improve learning. Galbraith (1967) defined technology as the systematic application of scientific or other organized knowledge to practical tasks. Galbraith's definition of a systematic application implies the use of a structured approach using certain principles to produce some practical tasks. Instructional technology is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication and employing a combination of human and non- human resources to bring about more effective instruction (Cassidy, 1982). According to Cassidy (1982), instructional technology is concerned with improving the effectiveness and efficiency of learning in educational contexts, regardless of the nature or substance of that learning. Instructional technology includes practical techniques of instructional delivery that systematically aim for

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effective learning, whether or not they involve the use of media (Gagne, 2013). The Internet is a "variety of interconnected networks and programs which can deliver information and media into computers around the world" (Levy, 1995, p. 187). The Internet can convey information in a variety of formats such as text, graphics, sounds, video, and real-time interaction, linking numerous people from many continents (McManus, 1994).

According to Reiser and Dempsey (2002), "Instructional design and technology encompasses the analysis of learning and performance problems, and the design development, implementation, evaluation and management of instructional and non-instructional processes and resources intended to improve learning and performance in a variety of settings, particularly, educational institutions and workplace" (p. 12). Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources' (AECT, 2004) Technology-mediated learning can "provide multiple media formats with greater interactivity; greater access to instructional assistance during and outside regular class schedules; asynchronous, individualized pacing for all; real-time assessment; feedback; reinforcement; supportive collaborative learning; optimal, high impact of instructor's expertise; efficient means of analyzing effectiveness; and dissemination of improvements" (Gifford, 1995).

Instructional technology (sometimes referred to as "educational technology") is the technology used to support teaching and learning. Keeping in mind that technology is one of many tools that teachers have at their disposal, it is important to remember that instructional technology should add to instruction, not replace it (Zollo & Winter, 2002). Instructional technology also

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enhances and extends learning. According to Zollo and Winter (2002), it is necessary for teachers to ask themselves the following questions before using instructional technology in the classroom: "Will the use of technology make this lesson better? Will it facilitate student understanding? Will students' capacity to demonstrate their understanding increases because of it?" Asking these questions will help determine when using instructional technology is appropriate, and when it is not.

Technologies are valuable resources, but only when used in a systematic process for developing human competence (Earle, 2002). In other words, the "what" of technology is not as important as the "how" of using the technology. Bernauer (1995) gives a better insight when he stated that "it is not technology per se that has resulted in improved student outcomes, but rather how the technology was used and integrated into instructional processes" (p. 1). This implies that not all new technology is good and the adoption of technology because it is new, is not a desirable action. A teacher should look at new technology and ask how it fits in their learning objectives, not the other way around where new technology is received and then a teacher tries to fit it into class. Use of technology in the classroom needs to be a proactive practice by teachers.

Design-Based Research

Design-based research has been given different names by various researchers. For instance, design-based research is sometimes referred to as Design Studies, Design Experiments, Design Research, Development Research, Developmental Research, Formative Research, and Engineering Research (Andriessen, 2006; Plomp, 2010; Wang & Hannafin, 2005). However, despite

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the numerous and varying names assigned to design-based research, the basic principles and techniques have been identified as the same to all (Wang & Hannafin, 2005). Unlike experimental research, DBR does not target the mere implementation of theories, designs, and models in a controlled fashion. Rather, it seeks to improve both theory and the educational context itself which is seen as a messy reality that should be studied as it is (Abdallah & Wegerif, 2014). They believed that learning is a human, social phenomenon that cannot always be studied effectively using the same scientific and objective standards applied to physical phenomena.

Another detailed description given by Plomp (2010, p. 4) is educational design research is the systematic study of designing, developing, and evaluating educational interventions (programmes, teaching-learning strategies and materials, products, and systems) as solutions for complex problems in educational practice, which also aims at advancing our knowledge about the characteristics of these interventions and the processes to design and develop them. Design-based research is a methodology designed by and for educators that seeks to increase the impact, transfer, and translation of education research into improved practice. In addition, it stresses the need for theory building and the development of design principles that guide, inform, and improve both practise and research in educational contexts (Anderson & Shattuck, 2012).

It can be deduced from the above definitions that DBR is systematic in addressing complex problems in education but there are no laid down guidelines for arriving at the solution (intervention), and hence its iterative nature in terms of developing the solution. These attributes of design-based research make it more appropriate when the problem under study is open and 'wicked' with an

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initial statement of the problem uncertain (Kelly, 2010; Van Den Akker, 1999). From the above definitions, one can clearly say that theory generation is one of the by-products of design-based research (Plomp, 2010; Van Den Akker, 1999; Wang & Hannafin, 2005).

From another perspective, Shavelson and Towne (2003) identify DBR as a type of research strongly based on prior research and theory and carried out in educational settings. It seeks to trace the evolution of learning in complex, messy classrooms and schools, test and build theories of teaching and learning, and produce instructional tools that survive challenges found in everyday practice. Barab and Squire (2004: p.2) view DBR as "a methodological toolkit" for deriving "evidence-based claims" from naturalistic learning contexts that are engineered in ways that allow for generating and improving these claims with the intent of "producing new theories, artefacts, and practices that account for and potentially impact learning and teaching".

In a design-based study, one of the main aims is to develop an intervention. The design of these interventions is a key feature of the quality and results of the research project. Brown (2005), the American researcher credited with first developing DBR, noted that "an effective intervention should be able to migrate from our experimental classroom to average classrooms operated by and for average students and teachers, supported by realistic technological and personal support" (p. 143). Mingfong, Yam San, and EkMing (2010) identified four design characteristics that they suggest must be aligned to create effective interventions. These are "frameworks for learning, the affordances of the chosen instructional tools, domain knowledge presentation, and contextual limitations" (p. 470). The researcher is careful to document the

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time, commitment, and contingencies that are involved in the creation and implementation of the intervention. These are documented so that readers of the research can judge for themselves the possibility of achieving similar or even better results from the use of the intervention in their own contexts.

Visscher-Voerman and Gustafson (2004) reported that there are four paradigms for the conduct of design-based research, which are not definitely mutually exclusive. These paradigms are instrumental, communicative, pragmatic, and artistic.

Under instrumental paradigm, designers specify their goals and outcomes of the product to be designed at the beginning of the process. That is, there should be consistency in the relationship among the goals, learning situations and processes, and outcomes of the design. In instrumental paradigm, there is exploration and formulation of intended outcomes, later translated into concrete product goals and measurable objectives. The later stages of the process are used for choosing and designing means to reach the concrete goals and objectives that result in a blueprint of the product. Instrumental paradigm uses less number of evaluation activities in the design process as compared to other paradigms (Visscher-Voerman & Gustafson, 2004).

Under the communicative paradigm, a good design should be the one agreed upon by the designers and other stakeholders. The beginning of the design is much of decision making based on negotiations among all stakeholders but not needs analysis of the existing situation. That is, there is a formulation of 'platform of ideas' from stakeholder negotiations leading to recognition of the problem, material constraints, basic pedagogical or psychological premises, and tentative concept of a product. Design guidelines

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are deduced through views of stakeholders on the product, process, and successive versions of the product (Visscher-Voerman & Gustafson, 2004).

Under the pragmatic paradigm, processes of designing, try-outs, and revisiting a number of prototypes are involved. During the process of prototyping, the end-users are involved in the try-outs. Pragmatic designers derive satisfaction from the effectiveness of their products and effectiveness is ascertained through try-outs with end-users. Pragmatic paradigm is characterized by formative evaluation and its iterations and revisions of prototypes (Visscher-Voerman & Gustafson, 2004).

Under the artistic paradigm, designers assert that the design process cannot be planned but designers' experiences and expertise are the driving forces. This implies that design guidelines are drawn based on designer's insight. Artistic designers assumed that reality is constructed by individuals and their subjective evaluation is the basis for judging products as good (Visscher-Voerman & Gustafson, 2004).

According to Visscher-Voerman and Gustafson (2004), design-based research approaches are personal and the selection of a particular paradigm is the preference of the designer. Based on this, the assumptions in relation to pragmatic paradigm formed the basis of using a design-based research approach. From the description of the design-based research, it could be appreciated that the design is cyclical in nature involving analysis, design, evaluation, and revision strategies till much more convincing results are attained (Andriessen, 2006; Ottevanger, 2001; Plomp, 2010; Van Den Akker, 1999).

Plomp (2010) identified the stages of design-based research as preliminary research phase, prototyping phase, and assessment phase.

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According to Plomp, the processes involved in the preliminary research phase include needs and context analysis, review of related literature, and analysis of curriculum materials, which in totality contribute to the establishment of the conceptual framework of the study. The iterative cycles of the design and development of an intervention to the identified educational problem are carried out at the prototyping stage of design-based research. Nieveen (2010) explained that the iterations help to improve the intervention under development and the tentative design principles.

The prototyping phase is built basically on formative evaluation and reflection. This is because there is a high possibility of having the intervention failing at its first implementation, hence the need for revision of some aspects of the intervention (Antwi, 2013). The iterative nature ensures that satisfying balance is achieved between the intended and the realisation (Plomp, 2010). At the assessment phase of design-based research, summative evaluation exercises are carried out to ascertain the quality of the intervention. Kelly (2010) explained that in design-based research, assessment is not necessarily targeting summation of students' learning. It is, however, a must as researchers should not be only interested in the iterative investigation of the impact of prototyping but to address the issue of how the impact will be measured. That is, the quality of the intervention is the measure of how successful the intervention is with respect to the pre-determined specifications. It should be noted further that the outcomes of the summative assessment are often used to improve upon the quality of the intervention (Plomp, 2010).

Design-based research basically focuses on designing and developing interventions in fieldworks (Plomp, 2010). However, it is most appropriate in

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educational research where a single study usually fails to provide the research community with a solution to an identified complex problem (Mckenney & Reeves, 2012; Walker, 2006); when the pedagogical content knowledge of the teachers (practitioners) involved is poor; when a solution to an identified educational problem will result in learning to the researchers and practitioners; and where the outcome of the research work could minimise significantly the malfunction in the educational system (Kelly, 2010).

It is also most appropriate to use design-based research when there is the need to evaluate the intervention as well as the processes involved in design and development of the intervention (Antwi, 2013); when there is the need to find realistic solutions to research questions (Agyei, 2012); when governments have the need to come out with challenging educational reforms with great impact in the future (Plomp, 2010). The design research and development process of a paradigm is mostly represented by the demarcation of characteristic phases or steps. Although the numerous process models by various authors (Mckenney & Reeves, 2012; Reinking & Bradley, 2008) differ in their number of phases and notional descriptions, their basic structures display a high degree of similarity. The research and development process is realized in iterative cycles of design, testing, analysis, and redesign. An incremental optimization of the design is effected within these cycles, and the development processes and principles are simultaneously documented. "One of the distinctive characteristics of the design experiment methodology is that the research team deepens its understanding of the phenomenon under investigation while the experiment is in progress"(Cobb, Confrey, DiSessa, Lehrer & Schauble, 2003, p. 12).

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The research and development cycles can start at different levels. For example, in the context of microcycles, the intervention within a classroom was developed iteratively, while its application range within the context of macrocycles was extended to other classes or schools (Gravemeijer & Cobb, 2006). The interventions should only be evaluated after an advanced refinement; i.e. the development potentials of the interventions should be exhausted before an approach is rejected as lacking usefulness (Lewis, Perry & Murata, 2006). Figure 1 below outlines the basic sequence of design research and developmental process, and identifies the targeted results for the individual process phases:

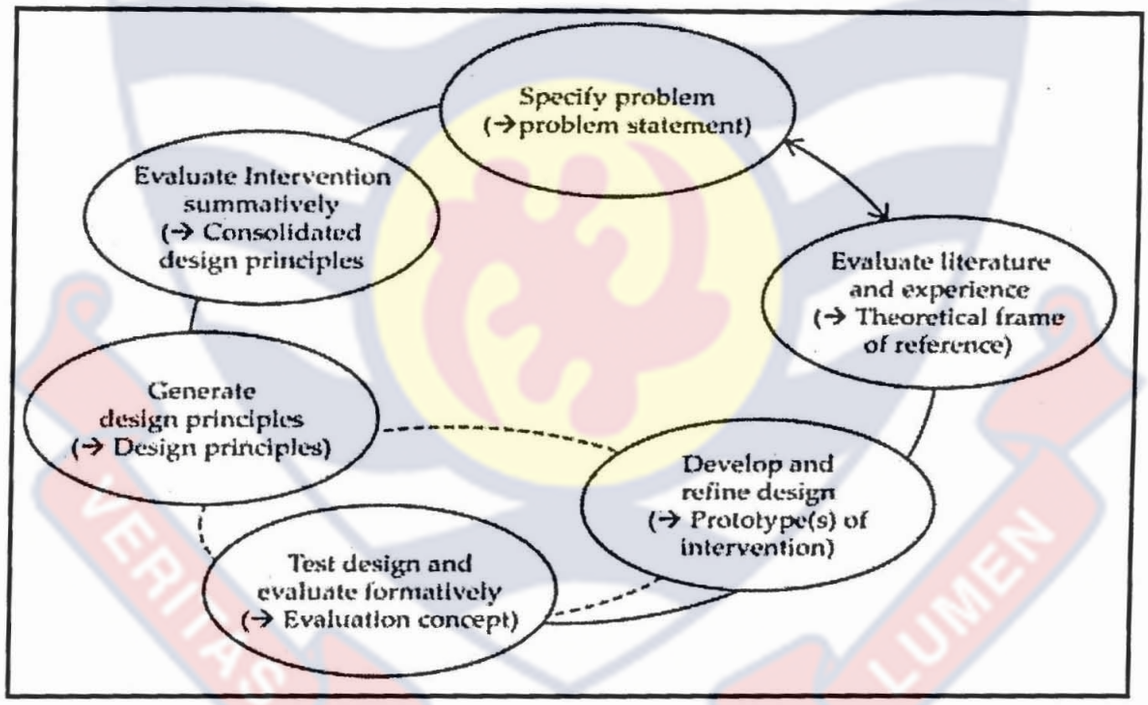


Figure 1: A diagram showing the processes involved in designed based research.

Source: (Euler, 2014)

Wang and Hannafin (2005) defined design-based research as a systematic but flexible methodology aimed at improving educational practices through iterative analysis, design, development, and implementation, based on

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collaboration among researchers and practitioners in real-world settings. According to Barab and Squire (2004), design-based research requires more than simply showing a particular design work but demands that the researcher moves beyond a particular design exemplar to generate evidence-based claims about learning that address contemporary theoretical issues and further the theoretical knowledge of the field.

Van Den Akker, Gravemeijer, McKenney and Nieveen (2006) recommended design research approach to guide research projects because of its role to increase the relevance of research for educational policy and practice, develop empirically grounded theories through combined study of both the process of learning and the means that support that process and increase the robustness of design practice. The approach is iterative in nature involving analysis, design and evaluation. An analysis is conducted in order to understand how to target a design (McKenney, et al., 2006). Cobb, et al., (2003) further suggested that design-based research projects have a number of common features, including the fact that they result in the production of theories on learning and teaching, are interventionist (involving some sort of design), take place in naturalistic contexts, and are iterative. Evaluation is formative, performed to improve the quality of prototypes (McKenney, et al, 2006) and /or summative to determine the impact of the intervention. These motives provide a stage for considering design-based research.

Constructivism

The study was informed by the Constructivist Approach to Teaching. The basic tenet underlying constructivism is that "Knowledge is actively constructed by the cognizing subject [learner], not passively received from the

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environment" (Matthews, 1992, p. 5). That means the theory of constructivism is based on the idea that human learning is not passive, but an active process of constructing meaning in the world around us. Such active process usually occurs in learners' mind (Dewey, 1938; Vygotsky, 1978). Additionally, the constructivist idea that existing knowledge is used to build new knowledge supports the theory that best practice can inform the future practice of others within a profession (Ormrod, 2004).

The brain behind this kind of philosophical approach is best described in Confucius, the renowned Chinese philosopher's quote: "I hear and I forget. I see and I remember. I do and I understand." This means that if teacher's spoon-feed students with knowledge as a mother does the weaning child, the students will forever be immature, not having the keen ability to make constructive arguments about issues and drawing tentative conclusions of situations. This soon makes them forget what they were taught. If they witness the carrying out of the phenomenon, they may remember through the sensory activity of seeing. The best option which the constructivist philosophers believe and propose is fully engaging the student in the teaching and learning processes so that his engagement would enable him personally to discover the knowledge or truth.

Constructivist pedagogies acknowledge instructional strategies where students learn by personally and socially constructing their own knowledge. Furthermore, the constructivist approach seeks ways to engage the learner within a context embedding personal and social experience (Good & Brophy, 2009). At the higher education level, the constructivist discourse seems to focus on five major themes, namely, students' expectations of course delivery and presentation, encouraging class participation, the instructional dilemma

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between structured and discussion-based tutorials, providing academic feedback to learners, and getting them engaged in productive group project work (Pascarella & Terenzini, 2005; Good & Brophy, 2009; Entwistle & Peterson, 2004).

Constructivism is a perspective on learning which is initiated from the learner's perspective rather than by that of the teacher. Material is not given to the learner in a one-way process. The constructivist perspective is that understanding is constructed by the learner rather than placed upon the learner. It also implies that students have their own ways of learning (Bonk & Cunningham, 1998), and their learning approaches focus on student-centred and cognitive learning (Ormrod, 2004).

The attributes of constructivism identified by Wilson (2010) are:

1. the process of meaning-making is an active one achieved through experience and interactions with the world;
2. through cognitive conflict, challenge or puzzlement, students make meaning of activities;
3. meaning-making involves collaboration, negotiation, and participation of students in authentic practices of communities;
4. students' reflection, assessment, and feedback in the natural setting enable students to make meaning of new information; and
5. students are responsible for meaning-making.

Sjoberg (2007) reported that constructivist learning theories are characterised by the fact that:

1. students actively construct meaning and meaning is not imposed on them;

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2. students come to the learning environment (lessons) with previous knowledge and experiences;
3. teachers' instructional strategies need to take advantage of students' previous knowledge and experiences in order to change or challenge this knowledge and experiences; and
4. students construct their individual knowledge collaboratively through social, cultural, and linguistic interactions with the physical.

Jones and Brader-Araje (2002) asserted that the introduction of constructivism has helped change the focus of knowledge as a product to knowledge to, as a process of knowing and according to Brown (2005), constructivism is currently the most important learning theory for educational policies, models, and practices. Osborne (1993) emphasized that the purpose of constructivism was due to the fact that all over the world teaching and learning process was dominated by didactic strategies and that constructivist strategies serve as a measure to address the shortfall in and to create a balance for students' learning. Tetzlaff (2009) explained that constructivist instruction can be combined with other instructions such as explicit learning to reduce the shortfall in teaching with the respective learning theories to enhance the social learning opportunities in the educational environment.

In the classroom, the constructivist view of learning can point towards a number of different teaching practices. In the most general sense, it usually means encouraging students to use active techniques (experiments, real-world problem solving) to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing (Dewey, 1938; Vygotsky, 1978). The teacher makes sure he/she understands the students' pre-

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existing conceptions and guides the activity to address them and then build on them. Constructivist teachers encourage students to constantly assess how the activity is helping them gain understanding. By questioning themselves and their strategies, students in the constructivist classroom ideally become "expert learners." This gives them ever-broadening tools to keep learning. With a well-planned classroom environment, the students learn how to learn. According to Osborne (1993), constructivist learning theories developed as a result of the necessary reaction needed at the time to counter the developmental stage model of cognitive growth. This is because the process of education should not only be the transmission of knowledge. However, the process of education must position students in such a way that they can acquire and make meaning of constructs and modern scientific knowledge.

According to Tetzlaff (2009), constructivism is characterised by pedagoies such as active engagement, constructive, intentional, complex, contextual, collaborative, conversational, and reflective. Constructivism believed that students' learning is an active process where students make meaning of sensory inputs (Hein, 1991) and knowledge is something that students built on through partial, incorrect, or apparently unnecessary existing knowledge unless carefully guided (Taber, 2011). Maor (1999) also identified five key practices that define constructivist learning environments as personal constructions of reality, simulated authentic learning environments, multiple representations of data, active learning and collaboration. For the purpose of this study, four (4) of the tenets of constructivist pedagogies have to be conceptualised as active, collaborative, authentic and intentional. Technology

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was the driving force that was used to power these constructivists pedagogies in the teaching of accounting in the classroom.

"In general, high-quality constructivist teaching requires more support, more access to resources, more careful design and attention to detail, more progress monitoring, and more carefully craft guidance than traditional instructor-led teaching" (Wilson, 2010, p. 5). Tetzlaff (2009) reiterated that constructivist learning theory does not eliminate teachers entirely from assisting students. That is, the traditional role of teachers as information presenters should give way to teachers' role as facilitators in the teaching and learning process (by asking questions, making suggestions, and explaining concepts) in the perspective of constructivism.

Notwithstanding the fact that students are responsible for their meaning-making under constructivism, teachers are to create opportunities to facilitate student learning (Taber, 2011; Tetzlaff, 2009). According to Tetzlaff (2009), an introduction of teachers' intervention into the constructivist learning environment is very necessary in order to prevent students from developing misunderstanding of the new material and to ensure that students work towards the lesson objectives. In constructivism, the role of teachers is to facilitate the teaching and learning process (Brown, 2005; Wilson, 2010). Cooperstein and Kocevar-Weidinger (2004) suggested that in using constructivist instructional strategies, teachers must conduct 'needs assessment' of the content of the session and put structures in place that will safeguard the skills and concepts students are expected to acquire at the end of the limited short period lessons. The structures are what Vygotsky referred to as scaffoldings, which guide and

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support students to make meaning of concepts. That is, teachers must lead students to make meaning of concepts.

Brown (2005) proposed that beyond constructivism through the path of social constructivism, instructional strategies are in the area of navigation, evaluation, integration, problem-solving, and communication. Here, teachers are coaches to students on how to navigate. From Taber (2011, p. 44), "… all meaningful learning is a process of personal meaning-making through that individual's current knowledge and understanding." This is to say that individual students make personal meaning of whatever is taught in the classroom in their own respect (Cooperstein & Kocevar-Weidinger, 2004). Notwithstanding the fact that students make different versions of the meaning of what they are taught by teachers, Taber (2011) asserted that a proportion of students make similar meaning of such concepts in line with the intended objectives of lessons.

From Ausubel's point of view, meaningful learning occurs when students are able to create linkages between new information and existing knowledge (Torre, Daley, Sabastian, & Elnicki, 2006). This is because, in constructivist lessons, students make meaning of new material by linking the new material to previous experience and knowledge (Cooperstein & Kocevar-Weidinger, 2004). Cooperstein and Kocevar-Weidinger (2004) suggested that to take advantage of constructivist learning theories teachers must provide students with opportunities of reflecting on concepts (Hein, 1991). This is because Torre et al. (2006) found that reflection is one of the important attributes of cognitive learning theory. Students are provided with the opportunity to make meaning of the situation after it has occurred or as the

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process unfolds. Students make meaning from their experiences through critical reflection. Teachers' role in constructivism is to facilitate students' critical reflection of experiences. According to Ernest (2010), the individual student makes meaning of signs and sees them as appropriate with respect to the individual's experience of the public use of the signs. Students individually reflect on such experiences of the use of signs and imitate their use.

From a constructivist point of view, meaning-making is not an instantaneous process but students learn new concepts through a reasonable period of time. This reasonable period of time allows students to reflect on the new material which enhances meaning construction (Hein, 1991). According to Cooperstein and Kocevar-Weidinger (2004), reflection is also necessary for teachers as it is for students. That is, teachers' reflection serves as a guide for instructional planning as teachers are their own best or worst critics. Constructivist learning theories are inductively oriented in nature. That is, students' meaning-making only occurs after experience (Cooperstein & Kocevar-Weidinger, 2004) and students experience the surroundings through the processes of interpretation (Taber, 2011) and the new knowledge is constructed as a result of assimilation of new experiences of the world and modification of the students' previous knowledge.

Constructivist instructional strategies, therefore, provide students with opportunities that create cognitive conflict between students' previous knowledge and experiences and the new information. This cognitive conflict promotes students' conceptual development (Jones & Brader-Araje, 2002). Lowenthal and Muth (2008) advocated that though constructivism is a theory of teaching. Teachers' instructional strategies should focus on the importance

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of context (Hein, 1991), authentic problems and tasks, discovery learning, student's prior knowledge, group projects and discussion, student choice, and authentic assessment. Such instructional strategies are anchored instruction, situated learning, and cognitive apprenticeship. Anchored instruction is that learning which involves lodging instruction in an authentic problem-based story, case study, or situation where students generate and test possible solutions to a problem; situated learning is that learning which involves social interactions and collaboration in authentic contexts; and cognitive apprenticeship is that learning which takes the form of traditional apprenticeship. These forms of instructional strategies developed out of constructivist learning theories make students active and use their previous experiences (Lowenthal & Muth, 2008).

Lowenthal and Muth (2008) reiterated that notwithstanding an adoption of constructivist learning theories in informing teachers' selection of instructional strategies, teacher-centred instructional strategies cannot be excluded entirely as they are all about meaning-making when it comes to learning and knowledge. However, constructivism is not rigid about teachers' input during the teaching and learning process as discovery learning or direct instruction is dependent on the specific learning activities and concept (Taber, 2011). From Richardson (2003, p. 1628), "direct instruction and lectures may still be part of a constructivist classroom." This is because students make meaning from any transmission model of teaching activities such as direct instruction and even from non-interactive media.

The major role of teachers in a constructivist lesson is to 'arrange the conditions of learning'. That is, teachers have to plan carefully in order to design activities for students to make meaning. Teachers must use examples and

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activities to lead students to the required knowledge. The use of sufficient examples enhance concept formation and the choice of activities also enhance the quality of meaning-making (Cooperstein & Kocevar-Weidinger, 2004). Teachers must also motivate students to appreciate why they need to learn the new material as this will help facilitate students' learning (Hein, 1991). Teachers' view of the nature of knowledge influences the selection and use of instructional strategies. It is, therefore, important for teachers to appreciate whether knowledge is independent of us or not.

From Hein (1991), constructivist learning theories believed that knowledge is not independent of students and that students have to construct meaning for themselves as they learn. Teachers should understand the world, organise it in a possible rational way and present it to students for them to manipulate the objects of the world. Hendriks, et al., (2010) and Richardson (2003) found that teachers' deep and strong content knowledge is a necessary tool in a constructivist classroom. However, teachers' instructional strategies, learning to learn and reflection on the strategies are equally important in constructivist lessons (Hendriks et al., 2010). This is because such teachers could provide students with opportunities to develop a deep understanding of concepts, internalise the concepts, understand the nature of the development of knowledge, and develop complex cognitive structures for connections to other bodies of knowledge. Wilson (2010) identified several benefits of constructivism. These include the fact that it corresponds to how students really learn; the outcomes of constructivist instruction are high-order thinking; it integrates emotions, affects, and engages discussions of learning and cognition; and it is applicable to out of classroom needs.

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Torre et al. (2006) found that under constructivism students form knowledge from the integration of learning activities and experiences into knowledge. Wilson (2010) stressed that the constructivist learning theory is appropriate for all teachers and students at all levels of education and training. However, some attributes of constructivist learning theory are excluded from some teaching practices because of its lack of specificity. The prior knowledge of the student in concepts is very important for students in learning new concepts. Hence, teachers need to adapt instructional strategies that will actively engage students mentally to confront any misconceptions and reflect accurate meaning-making (Kruse, 2009). Mundry (2005) explained that from cognitive constructivism, students are said to build knowledge upon the previous knowledge. There is, therefore, the need to take advantage of such previous knowledge by using diverse experiences to add to and to challenge such previous knowledge. Cooperstein and Kocevar-Weidinger (2004) found that during constructivist lessons, students build on concepts through activities. The activities assist students to make meaning of abstract concepts, transfer such concepts, and retain them. Students further learn as they engage in activities which are carefully selected to resemble real-life situations (referred to as authentic tasks). Instructive instruction includes problem-based learning, anchored instruction, cognitive apprenticeship, intentional learning environment, and REALs, which is a rich environment for authentic learning, (Wilson, 2010). The constructivist learning theories provide teachers at all levels of education as well as all subjects/courses with a sound theoretical basis for the selection of instructional strategies (Taber, 2011).

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Technological Pedagogical Content Knowledge (TPACK)

The study was also informed by Mishra and Koehler's (2006) teaching with technology model. They posit that thoughtful pedagogical uses of technology require the development of a complex situated form of knowledge which they refer to as Technological Pedagogical and Content Knowledge (TPACK). Building on Shulman's (1986) "pedagogical content knowledge" model, TPACK outlines the essential qualities of teacher knowledge required for effective integration of technology in teaching.

According to Mishra and Koehler (2006), TPACK is an emergent knowledge that goes beyond the three individual components of content, pedagogy and technology and represents a class of knowledge that is central to teachers' work with technology. Early initiatives in technology in education, focused simply on the supply of hardware to schools under the misguided assumption that the mere presence of computer hardware would magically transform the teaching-learning process. Even in those cases where educational software was provided along with the hardware, there was the belief that knowledge was somehow embedded in the software and the technology, therefore, would do the teaching (Sutherland, 2004). The painful lesson that has been derived from that initial experience is that introducing technology to the educational process is not enough. Of greater importance to the successful integration of ICTs in the educational process is what teachers must know in order to effectively integrate technology into their teaching (Mishra & Koehler, 2006).

The argument is that what is required is not simply knowledge of content, pedagogy and technology but more importantly an understanding of the

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interrelationship between the three types of knowledge such as what pedagogy is suitable for which content, how technology and content are related and how pedagogical strategies can be applied to the use of technology. According to Mishra and Koehler (2006), there is a dynamic equilibrium between the three and productive technology integration requires an appreciation of that complex relationship. Viewing any of these components in isolation represents a disser vice to good teaching. They argue that quality teaching requires developing an understanding of the complex relationship between these components and using this understanding to develop appropriate context-specific strategies.

Most teacher-training courses with respect to technology integration in education focus on teaching basic computer literacy skills. The underlying belief being that teachers simply have to be trained to use the basic application packages in order to successfully incorporate technology in their classrooms. Most scholars, however, agree that these traditional methods of technology training for teachers are ill-suited for preparing teachers to be intelligent users of technology for pedagogy (Mishra & Koehler, 2006). Merely knowing how to use technology is not the same as knowing how to teach with it.

Technological Pedagogical Content Knowledge (TPCK) was introduced to the educational research field as a theoretical framework for understanding teacher knowledge required for effective technology integration (Mishra & Koehler, 2006). The TPCK framework acronym was renamed TPACK (pronounced "tee-pack") for the purpose of making it easier to remember and to form a more integrated whole for the three kinds of knowledge addressed: technology, pedagogy, and content (Thompson & Mishra, 2007). Technological

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Pedagogical Content Knowledge (TPACK) is a construct that has emerged in the field of technology and teacher development in the last decade.

The TPACK construct evolved from Shulman's (1986) original construct: pedagogical content knowledge (PCK). In his early work, Shulman (1986) defined PCK as "the ways of representing and formulating the subject that makes it comprehensible to others" (p. 9). In other words, PCK is a particular type of knowledge that teachers construct through the dialogic interaction between pedagogy and discipline-specific content. Koehler and Mishra (2005) later expanded Shulman's original construct by proposing the addition of technological knowledge, which in its basic form includes knowledge of how the technology operates (e.g., knowledge of typing, knowledge of operating a piece of software, etc.). Following Shulman's model, Koehler and Mishra (2005) also used the concept of knowledge amalgamation, that is, the interaction between each of the three "core" bodies of knowledge with one another gives rise to blended types of knowledge, namely technology pedagogy knowledge (TPK), pedagogy content knowledge (PCK), and technology content knowledge (TCK) (Rodríguez, 2006).

The combination of these three blended types of knowledge results in a unique, highly contextualized type of knowledge: TPACK. The assumption is that for effective technology integration to take place, instructors need to develop TPACK (Koehler & Mishra, 2005; Koehler, 2004). The TPACK model provides a clear visual framework for practitioners to understand the knowledge required for effective integration of technology. TPACK is one form of highly practical knowledge that combines teachers' concurrent and interdependent curriculum content, general pedagogy and technological understanding (Harris

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& Hofer, 2009). Teacher education in many universities has utilised TPACK to evaluate programmes and to pass on the knowledge of this framework to future teachers. The acronym 'TPACK' has captured the idea of a total package of elements (Borthwick, Charles, Pierson, Thompson, Park, Searson & Bull, 2008, p. 1) that can be used to assess the use of technology and its integration with pedagogy.

Technological Pedagogical Content Knowledge (TPACK) attempts to capture some of the essential qualities of knowledge required by teachers for technology integration in their teaching. At the heart of the TPCK framework, is the complex interplay of three primary forms of knowledge: Content (C), Pedagogy (P), & Technology (T) and their intersections. TPACK refers to the synthesized form of knowledge for the purpose of integrating ICT/educational technology into classroom teaching and learning. The core constituents of TPACK are content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK). The interaction of these three basic forms of knowledge gives rise to pedagogical content knowledge (PCK), technological content knowledge (TCK), technological content knowledge (TPK) and the TPACK. As a form of knowledge, TPACK has been described as situated, complex, multifaceted, integrative and/or transformative (Harris, Mishra, & Koehler, 2009; Koehler & Mishra, 2009; Manfra & Hammond, 2008). As a framework, it has been employed to unpack ICT-integrated lessons, teachers work with ICT to design teacher education curriculum, to design classroom use of ICT and to frame literature review pertaining to ICT or educational technology (Polly, Mims, Shepherd, & Inan, 2010). In essence, this is a

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powerful framework which has many potential generative uses in the research and development related to the use of ICT in education.

According to Mishra and Koehler (2013), the rapid rate of technology change leads to increasing pressure on teachers to keep up with these new tools and devise new ways to integrate them into their teaching. This means that teachers need to go beyond "functional fixedness" and instead need to creatively repurpose these tools to make them pedagogically viable. This requires a deep understanding not just of the technology but also of the content to be covered, the pedagogical approaches to be supported and the contexts within which teaching/learning is to happen. Situational creativity, flexibility, tolerance for ambiguity, and a desire to "play" are key attributes of the TPACK knowledge teachers need to develop for successful technology integration in the 21st century (Mishra & Koehler, 2013). They believed that effective technology integration for pedagogy around specific subject matter requires developing sensitivity to the dynamic, transactional, relationship between all three components. Mishra and Koehler (2013) opined that there is no single technological solution that applies to every teacher, every course, or every view of teaching. Rather, solutions lie in the ability of a teacher to flexibly navigate the spaces defined by these key elements.

Towards the Conceptual Framework of the Study

The conceptual framework for this study was developed with reference to Confucious's quote "I hear and I forget. I see and I remember. I do and I understand" (as cited in Awayiga, Onumah & Tsamenyi, 2010). Figure 2 below presents the conceptual framework for the study by highlighting the interplay between instructional technology and constructivists pedagogical strategies

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(active, collaborative, authentic and intentional) to produce interactive teaching of accounting.

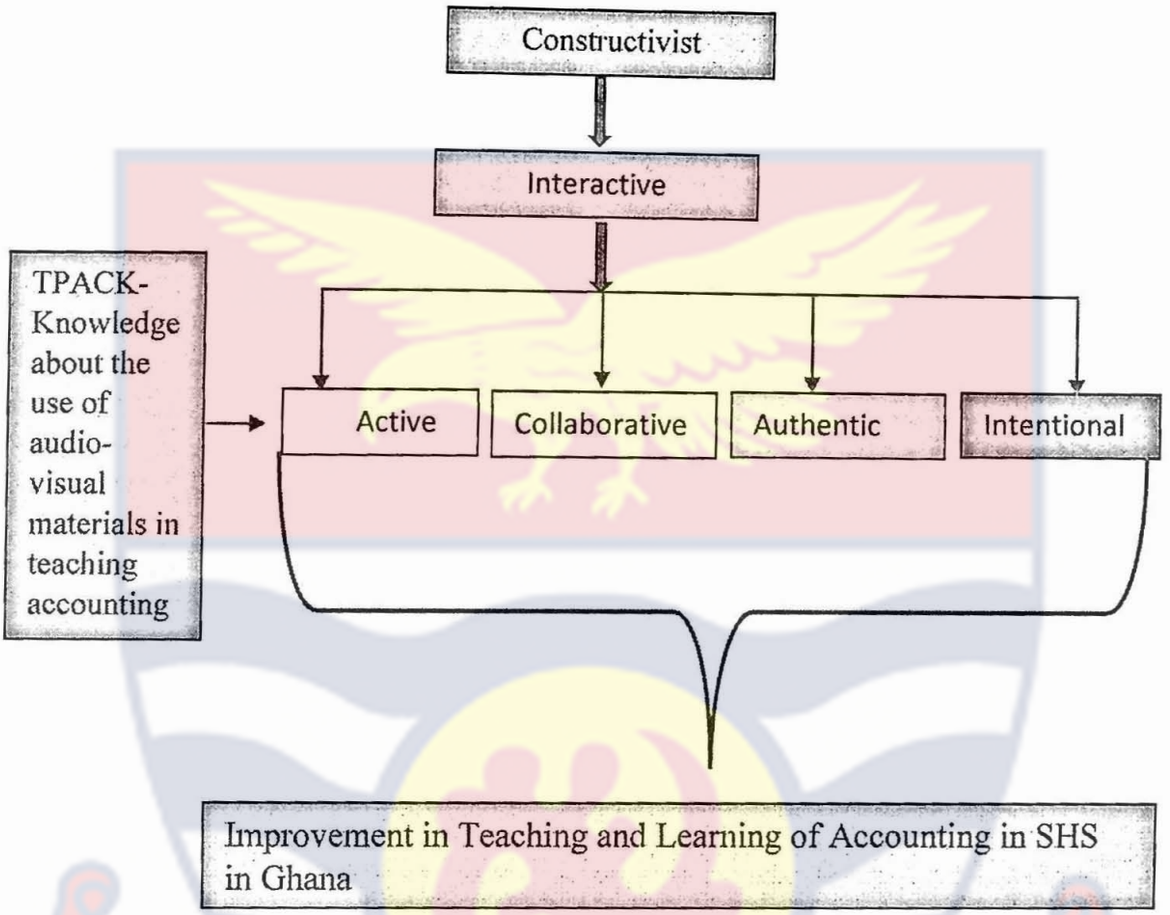


Figure 2: Conceptual framework for the study.

Source: (Author's Own Construct, 2018).

From the model above, the overriding theory is the constructivist approach to teaching which tenets involve using pedagogical strategies to teach in an interactive manner. Interactive teaching has been conceptualised in the study as active, collaborative, authentic and intentional teaching. For the purpose of the study, the following conceptualizations were made with respect to active, collaborative, authentic and intentional. Active - teaching activities engage students in solving accounting problems independently. Collaborative – teaching dimension that encourages students to work together in groups in solving accounting problems. Authentic - teaching dimension that requires

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students to apply the principles learnt in accounting to their everyday life experiences. Intentional – teaching approach in which the teacher continually monitors students' progress and provides feedback to students in accounting lessons.

In interactive teaching, students are fully engaged in a lot of meaningful activities that mirror real-world issues and problems. These activities are usually carried out in teams or groups with the aim of achieving the objectives for the lesson. The group works in interactive lessons promote interactions among peers as well as the teacher in the teaching and learning process. The role of the teacher in an interactive classroom is that of facilitation of the teaching and learning process whilst the students are seen as active participants in the classroom. Teaching is not just dispensing with the subject matter (Tamakloe, et al., 2005). Accordingly, accounting teachers must care for the totality of the development of their students. Therefore, the main objective of teaching accounting should not only be to develop the intellectual skills of students but also to provide them with opportunities to work individually, in pairs, small and large groups and learn to be lifelong learners. This will ensure that students become independent problems solvers and active team players.

Research has also proved that the integration of instructional technology in teaching has the potential of making the lesson more interactive and sustains students' interest (Allan, 2007; Fu, 2013; Koh, 2013). Technology (use of audio-visuals) was the driving force that was used to power the pedagogical strategies (active, collaborative, authentic and intentional) to produce interactive teaching. The framework above illustrates further that, if accounting teachers use technology (audio-visual materials) together with constructivist

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pedagogical strategies (active, collaborative, authentic and intentional) effectively in teaching accounting, the teaching and learning of accounting will be more interactive. Thus, the study conceptualised that the improvement in the teaching and learning of accounting would be evidenced from accounting lessons where the teachers design the lessons in such a manner that accounting students actively engage in practical activities in a collaborative manner with the aim of achieving specific learning outcomes.

Conceptual Review

Pedagogical strategies

Pedagogy involves activities that evoke changes in the learner. Watkins and Mortimore (1999) define pedagogy as 'any conscious activity by one person designed to enhance learning in another" (p. 3). According to Bernstein (2000), pedagogy 'is a sustained process whereby somebody acquires new forms or develops existing forms of conduct, knowledge, practice and criteria from somebody(s) or something deemed to be an appropriate provider and evaluator' (p. 78). Bernstein contrasts two models of pedagogy that focus on the teacher's organisation, management, discourse and response to the students and which provide a useful theoretical framework with which to understand different pedagogic approaches:

Performance model: visible pedagogies where the teacher explicitly spells out to the students what and how they are to learn, with a recognisable strong framing or lesson structure, collective ways of behaving and standardised outcomes;

Competence model: invisible pedagogies with weaker framing that result in an ostensibly more informal approach where the teacher responds to individual

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children's needs, with hidden or unfocused learning outcomes (Bernstein, 1990).

According to Alexander (2001), teaching 'is an act while pedagogy is both act and discourse' (p. 540). Pedagogy comprises teachers' ideas, beliefs, attitudes, knowledge and understanding about the curriculum, the teaching and learning process and their students, and which impact on their "teaching practices', that is, what teachers actually think, do and say in the classroom (Alexander 2001). Teacher beliefs are contextually based, and Alexander's definition encompasses social, cultural and political aspects. Teachers' thinking and ideas are manifested in their overall pedagogic approaches, garnered from the kinds of teaching and learning experienced as school students themselves, the approaches promoted in initial teacher education (ITE) and continuing professional development (CPD), those specified in the current school curriculum and those pervasive in colleagues' classrooms (Westbrook, Durrani, Brown, Orr, Pryor, Boddy & Salvi, 2013). Westbrook et al. (2013) opined that recent curriculum reforms have moved away from 'teacher-centred' pedagogic approaches to more 'student-', 'learner-' or 'child-'centred, or 'active' learning approaches. According to Westbrook et al (2013), teachers' strategies signify their dispositions towards teaching and learning and are a more concrete expression of their approach, wanting, for example, their students to feel safe, or encouraging their participation or cultivating a cheerful teacher persona or being seen as a knowledgeable and authoritative figure.

Various authors have viewed the term pedagogy from different perspectives and all these definitions concerned with what a teacher does to influence learning in others. Siraj-Blatchford, Sylva, Muttock, Gilden and Bell

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(2002) define pedagogy as the instructional techniques and strategies that allow learning to take place. It refers to the interactive process between teacher/practitioner and learner and it is also applied to include the provision of some aspects of the learning environment (Siraj-Blatchford, et al., 2002, p. 10).

Quality teaching is defined as pedagogical practices that facilitate for diverse children their access to knowledge, activities and opportunities to advance their skills in ways that build on previous learning, assist in learning how to learn and provide a strong foundation for further learning (Farquhar, 2003). Pedagogy is an extremely complex phenomenon comprising a wide variety of practices underpinned by principles acquired through training and as a result of professional experiences and personal understandings (Moyles, Adams & Musgrove, 2002). Effective pedagogy not only produces outcome results in relation to input but also represents a common core of values and objectives to which all those involved can subscribe (Moyles, et al., 2002). Since recent curriculum reforms have moved away from 'teacher-centred' pedagogic approaches to more 'student-", "learner-" or 'child-'centred, or 'active' learning approaches (Westbrook et al., 2013), it is, therefore, imperative for teachers to use Constructivist Pedagogical Strategies (Active, Collaborative, Authentic, Constructive and Intentional) teaching, among others, in their teaching.

Active

Active learning is generally defined as any instructional method that engages students in the learning process. Active learning requires students to do meaningful learning activities and think about what they are doing (meta-cognition) as individuals; pairs or structured groups. The core elements of active

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learning are student activity and engagement in the learning process. Benefits of active teaching, according to (PDST, 2017), include; focus on the learner and learning; improved information retention; development of communication and higher-order thinking skills, improved motivation and variety of learning opportunities (PDST, 2017).

Active learning instructional strategies include a wide range of activities that share the common element of involving students in doing things and thinking about the things they are doing (Bonwell & Eison, 1991). Active learning instructional strategies can be created and used to engage students in (a) thinking critically or creatively, (b) speaking with a partner, in a small group, or with the entire class, (c) expressing ideas through writing, (d) exploring personal attitudes and values, (e) giving and receiving feedback, and (f) reflecting upon the learning process. Active learning instructional strategies can be (a) completed by students either in-class or out-of-class, (b) done by students working either as individuals or in a group, and (c) done either with or without the use of technology tools (Eison, 2010).

Active learning inherently implies a "doing". A classroom where the teacher has adopted a constructivist approach to learning expects performance and persistence from the learners. The students are expected and encouraged to generate their own ideas and knowledge by execution, exertion, and expansion of the known (Lunenberg, 1998; Wolmarans, 2000; Wilson, 2010). Learners cannot construct knowledge just by passively receiving, acquiring, or accepting it; nor by inertly listening nor heeding. Knowledge is not formed during the transmission of it. Therefore, the emphasis for instruction must be on the creation of meaning and understanding while encountering new information or

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new contexts. Active learners need to be involved by partaking, participating, constructing and cooperating. Active learning must happen in order for knowledge to be owned by the learner (Dorit, 1999). According to Jonassen and Reeves (1996), learners must be given opportunities to be active in ways that will promote self-direction, creativity and critical analysis of problems requiring a solution. Brown, (2005) affirm that "learning that becomes a continuous, life-long process results from acting in situations."

Wilson (2010) created a list of opportunities for the learners to develop more active constructions of meaning. The list included simulations, strategy and role-playing games, multimedia learning environments, intentional learning environments, storytelling structures, case studies, Socratic dialogues, coaching and scaffolding, learning by design, learning by teaching, group cooperation, collaborative learning and holistic psycho technologies. Active learning involves using knowledge and skills to "generate" a product such as an essay, a concept/semantic map, or a physical artefact which embodies knowledge. This may also involve investigating to create a solution to a problem. A teaching strategy in tune with generative learning is cognitive apprenticeship (Collins, 1991). Learning experiences should be realistic and faithful to the original phenomena, rather than abstract descriptions or "inert knowledge". Instruction should be anchored in real-world problems, events or issues which are appealing and meaningful to students. Realistic problems allow students to take ownership of their solutions, develop deeper, richer knowledge structures, require more systematic problem-solving methods, and are more likely to benefit from collaborative efforts.

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An active learning environment is the one which is student-centred [that is where students are supported to construct their own meaning of concepts]; knowledge-centred [that is where instructions are geared towards content as the most important for students' learning]; assessment-centred [that is where structures are put in place to continuously assess students' learning and provide feedback]; and community-centred [that is where provision is made for continuous students' interactions in the learning process] (Mundry, 2005). Every student in a learning situation goes through processes of change to support behaviour change and the processes of change and its addend reversion could occur a number of times ahead of any change in behaviour. In the active learning environment, students should be seen doing a lot of activities themselves with the teacher serving as a facilitator in the teaching and learning process. For the purpose of this study, active teaching was measured in terms of the pre-service accounting teachers' ability to prepare and teach a lesson in such a manner that the students were engaged independently in solving practical accounting problems throughout the lesson.

Collaborative

Collaborative learning can be defined as a learning environment in which students make contributions to solve problems together (Teasley & Roschelle, 1993). Following social constructivism concepts, learners construct knowledge through interacting with others (Atwater, 1996). Collaborative learning is usually embedded in other student-centred learning models such as inquiry-based learning and problem-based learning. Contemporary literature on collaborative learning shows the extensive involvement of technology (Resta & Laferriere, 2007). Collaborative learning has potential benefits for cognitive and

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metacognitive achievement, while its effectiveness depends on factors such as group members' prior knowledge, the composition of the group and the quality of explanations (Janssen, Kirschner, Erkens, & Paas, 2010). Without enough prior knowledge, learners may fail to provide high-quality explanations or construct a deep understanding of the perspectives provided by other group members.

A group composition without above-average students may generate insufficient joint attention to the group task and low quality of collaboration (Webb, Nemer, Chizhik, & Sugrue, 1998). High quality and elaborative expla nations (for example, explaining to "why" questions) in group discussion predicts high group performance (Barron, 2003). Metacognitive activities, for example, planning and monitoring the task progress and evaluating group plans, can also improve group performance (Janssen, Erkens, Kanselaar & Jaspers, 2007). In assessing group collaboration, in addition to measuring individual academic performance, the teacher needs to observe how group members respond to each other and whether joint attention to the task can be maintained (Barron, 2003).

The age-old adage of "iron sharpening iron" is indeed true for learners in a variety of guided situations. The natural reaction of mulling over a complex problem or situation with others allows for deeper levels of reasoning, new perspectives, shared responsibilities and greater motivation to remain focused on the task (Rodrigues, 2000; Boudourides, 1998; Petraglia, 1998). Teachers need to recognize collaboration as a viable method of creating individual meaning, rather than viewing it as a means of acquiring information from someone else. Cheating is to defraud, to take; collaborating is to build,

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cooperate. This action of social negotiation (Vgotzky's) is beneficial and sometimes essential to acquiring specific knowledge. There is often concern voiced by students, parents and teachers alike about the value or the evaluative problems of collaborative learning in a classroom. Wolmarans (2000) reveals that empirical research indicates co-operative learning promotes higher achievement than competitive and individualistic learning does.

Rogoff (1990) compares collaborative work to that of apprenticeships, where the one who has mastered a skill or concept aids the learner in acquiring similar knowledge. This process of learning is flawed if the "knower" chooses to hand over answers, without effort or exertion (a doing) to create or know, on the part of the apprentice. Collaborative work allows for classrooms to be more cooperative than competitive. Students begin to view one another as resources rather than sources of ridicule. The social context within which a learner resides is crucial to their achievement (Salomon & Perkins, 1998; Petraglia, 1998). Strommen and Lincoln (1992) found that constructivism has led to the additional discovery that, powerful gains are made when children work together, children are able to reflect on and elaborate not just their own ideas but those of their peers as well. Children come to view their peers not as competitors but as resources. To understand a concept to the point of being able to explain it to others is when real learning has occurred and personal knowledge has been acquired. Strommen and Lincoln (1992) findings are in line with the view of Rogoff (1990) that in the collaborative classroom, students see their peers as a resource but not competitors. This implies that students in high collaborative classrooms will have no difficulty in sharing information with their peers in the class. Lunenberg (1998) believes the value of collaborative

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learning is in the opportunity for learners to elaborate on their own ideas as well as those of their peers.

Social learning theories share the view that knowledge is constructed when students practise what they learn. That is, knowledge construction cannot be separated from practice (Wilson & Peterson, 2006). All social learning theorists share the view that learning is basically a social phenomenon which occurs within our communities; individual student performance should be assessed based on the true participation of the individual in the activity and that the reward of performance should be determined by the members of the group (Wilson & Peterson, 2006); and meaning-making is context-specific (Bonk & Cunningham, 1998; Wilson & Peterson, 2006). Based on the fact that social phenomenon occurs within our communities, Wilson and Peterson (2006) explained that meaning-making of concepts is dependent upon the interactions among individuals in their communities (such as the classroom) and their participation in activities. There is, therefore, collaboration in learning through participation. To support students to make meaning of concepts through peer or greater social interactions, teachers must choose instructional strategies that will enable students to collaborate. That is, students must collaborate in order to push and support each other to learn (Kruse, 2009).

General class discussions should employ collaborative learning environment but not where the teacher becomes the centre of attraction in the teaching and learning process. Consequently, in such class discussions, teachers actively ask follow-up questions, provide information, prevent individual student dominance, and maintain focus. Kruse (2009, p. 6) said: Rather than being concerned with my student learning style, I will make much better use of

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my own mental effort and planning by considering students' developmental stage, prior experience, initial conceptions and the manner in which the content is best presented.

Wilson and Peterson (2006) emphasized that teachers cannot assume only one role in presenting instructional materials to students. This means that teachers should, as a matter of importance, use different instructional strategies in teaching as and when necessary. Teachers have to identify students with characteristics that will facilitate the process of teaching and learning. This implies teachers have to take advantage of the potentials of students and use such potentials in forming teams where the talents could be of benefits to the group members. In collaborative teaching, teachers encourage students to share ideas and experiences, work in groups and support each other in the learning process. For the purpose of this study, the pre-service accounting teachers' use of collaborative teaching dimension was measured in terms of their ability to use strategies that encouraged students to work together in groups in solving accounting problems.

Authentic

Authentic learning is learning designed to connect what students are taught in school to real-world issues, problems, and applications; learning experiences should mirror the complexities and ambiguities of real life. Experiences that do not encourage the children to make meaning from their learning will quickly be forgotten. Any learning experience should aim to instil authenticity into every task, lesson and unit to ensure that 'students are [able] to develop problem-solving skills and confidence in their own learning abilities' (Nicaise, Gibney & Crane, 2000). Authentic learning environments occur when

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instruction is designed to facilitate, simulate and recreate real-life complexities and occurrences (Honebein, Duffy & Fishman, 1993; Wolmarans, 2000). Petraglia (1998) contends that sometimes pre-authentication occurs whereby learning materials and the environments are "fixed" by the taskmaster before learner interaction occurs.

According to Petraglia (1998), learners and educators alike must recognize that there are great lessons to be learned through failure. He was of the view that an authentic learning environment prepares learners for the real-life situations, they will encounter in the days and years ahead of them. Resnick (1987) suggests that schools should be simulating more of the productive learning that occur out-of-school in order to prepare students for successful performance in unpredictable and unforeseen situations. Authentic learning is concerned with depth of learning rather than the breadth of information sucked in and then spewed out; where memorization is misdiagnosed as being well-informed (Resnick, 1987). Authentic learning environments provide children with rich experiences and opportunities to construct knowledge in context, and in ways that make sense to their existing knowledge which is based on prior experiences (Cox-Petersen & Olson, 2000). Reeves (1997) speaks about the importance of contextual learning in order for students to make connections between the problem and the solution. He was of the view that, in order for contextual learning to occur, students will still find it necessary to acquire factual knowledge; the difference is in the method of acquisition.

According to Reeves (1997), students ascertain this knowledge through their own experiences rather than as second-hand donations. Authentic learning experiences were more common in the past through apprenticeship "schooling"

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which was highly concrete and had great experiential value (Brown, Collins, & Duguid, 1996). As the schooling system changed to accommodate the Industrial Revolution, the learning became much more abstract utilizing mainly discussion, lectures, and paper and pen tasks. This has become the accepted method of educating our learners and is criticized because the abstractedness detracts from the experiential experience (Brown, 2005). There should be a close connection between the knowledge and skills students acquire from the lesson in the classroom and the problems they meet in their everyday life. This will enable the students to be able to use the skills acquired in the classroom to solve the problems they meet in a real-life context. For the purpose of this study, the pre-service accounting teachers' use of authentic teaching was measured in terms of their ability to prepare a lesson in a manner that students are able to apply the principles in accounting to their everyday life experiences.

Intentional

Intentional teaching means teachers act with specific outcomes or goals in mind for children's development and learning. "Academic" domains (literacy, mathematics, and science), as well as "traditional" early learning domains (social and emotional, cognitive, physical, and creative development) all, have important knowledge and skills that young children want and need to master. Intentional teachers, therefore, integrate and promote meaningful learning in all domains. Intentional teaching requires wide-ranging knowledge about how children typically develop and learn (Epstein, 2007). Intentional teachers have a repertoire of instructional strategies and know when to use a given strategy to accommodate the different ways that individual children learn and the specific content they are learning.

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Intentional teaching strategy requires that teachers ask which type of learning experience is likely to be most effective in which content areas, and what teachers can do to optimize learning in that mode. It also emphasizes that regardless of whether children engage in child or adult guided experience, teachers always play a vital educational role by creating supportive environments and using instructional strategies to advance children's thinking to the next level. To be "intentional" is to act purposefully, with a goal in mind and a plan for accomplishing it. Intentional acts originate from careful thought and are accompanied by consideration of their potential effects. Thus, an "intentional" teacher aims at clearly defined learning objectives for children, employs instructional strategies likely to help children achieve the objectives, and continually assesses progress and adjusts the strategies based on that assessment (Epstein, 2007).

Intentionality refers especially to how teachers interact with children. Pianta (2003) defines intentionality as "directed, designed interactions between children and teachers in which teachers purposefully challenge, scaffold, and extend children's skills". Berliner (1992) emphasizes that effective teaching requires intentionality in interactions with students, with an understanding of the expected outcomes of instruction. Berliner (1992) outlined characteristics of good intentional teaching as *High expectations*—Teachers assume children are capable of achieving meaningful educational goals. Teachers who expect children to learn will deliberately engage in instructional activities to enhance children's knowledge and skills. Teachers' high expectations are also transmitted to children and parents, who then see themselves as active and capable participants in the learning process.

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Planning and management—Teachers have concrete plans to introduce the subject matter and sequence students' learning. They can manage both individual behaviour and group dynamics. While guiding the class toward defined objectives, teachers remain open to pursuing related topics that arise and capture students' interest. *Learning-oriented classroom*—Children, as well as teachers, value the classroom as a place where learning occurs. When adults act with the intention of teaching, children can act with the intention of learning. *Engaging activities*—Teachers understand how children learn and that activities and ideas connected to children's own experience are more likely to capture their interest. They understand also that tasks pegged too far above or below children's current capabilities can undermine children's self-confidence in their ability to learn.

Thoughtful questioning—Teachers pose questions to get insight into what children are thinking and to stimulate their thought processes. Rote questions and the thoughtless recitations they evoke, by contrast, not only fail to further children's learning but can derail it through boredom, resentment, or discouragement. *Feedback*—Children naturally look to teachers for supportive and evaluative feedback, and effective teachers know when and how to provide it. Presenting information, making comments, asking questions, identifying contradictions in children's thinking, and posing "what if" challenges are hallmark strategies of intentionality. Unlike praise or criticism, which merely indicates "right" or "wrong" and may be interpreted as a sign of the teacher's personal (dis)approval of the child (e.g., "I like the way you solved that problem"), evaluative feedback focuses on learning rather than judgment

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("Your idea to carry the cup on a tray solved the problem of water spilling on the floor").

Intentional teaching involves educators being thoughtful, purposeful and deliberate in their decisions and actions. Intentional teaching is an active process and a way of relating to the children that embrace and build on their strengths. When teachers use intentional teaching practices, they take an active role in children's learning. Teachers invite children to share their interests and ideas, identify opportunities to help children to become involved in a play, and build on interests and ideas that they observe that day (QCAA, 2014). Teachers recognize that children's learning occurs in social contexts and make deliberate, well-planned decisions to support learning through children's social interactions with a range of partners. Teachers also embed intentional teaching strategies in the decisions they make as they plan and organize the physical learning environment, and engage with children in the context of the play, real-life engagements and routines and transitions. Teachers use a wide range of interactional strategies as they co-construct learning with children and support them to investigate and explore ideas. Through interactions, they extend children's thinking, challenge their ideas and expand their interests. Teachers introduce ideas and make links to children's ideas in order to support children to discover new possibilities and develop and test hypotheses (QCAA, 2014).

Intentional teaching involves thoughtful conversations and carefully selected and planned experiences. Intentional teaching includes monitoring, assessing and documenting children's learning. Teachers who engage in intentional teaching use strategies such as modelling and demonstrating, open questioning, speculating, explaining, engaging in shared thinking and problem

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solving to extend children's thinking and learning (ACECQA, 2012). The intentional teacher aims at clearly defined learning objectives for children, employs instructional strategies likely to help children achieve the objectives, and continually assesses progress and adjusts the strategies based on that assessment. To be intentional means to act deliberately. For the purpose of the study, intentional teaching was measured in terms of how the pre-service accounting teachers continually monitored students' progress and provided feedback to students.

The use of audio-visual materials in teaching

According to Rao and Jyoti, (2012) teaching is communication. It is through communication that teaching is accomplished. Teachers must make learning as enjoyable as possible; a duty which is hard to carry out without having the communication abilities required by every teacher. So, in order to avoid any breaking of communication between the teacher and the student, it is mostly preferable to use audio-visual aids, (Rao & Jyoti, 2012). Teaching aids arouse the interest of learners and help the teachers to explain the concepts easily. Audio-visual aids are those instructional aids which are used in the classroom to encourage the teaching-learning process. "Any device which by sight and sound increase the individuals' experience beyond that acquired through reading is described as an audio-visual aid" (Singh, 2005). Audio-visual aids are those instructional devices which are used in the classroom to encourage learning and make it easier and interesting. The materials such as charts, maps, models, film strip, projectors, radio, television are called instructional aids (Rather, 2004).

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Audio-visual aids provide the learners with realistic experiences, which capture their attention and help in the understanding of historical phenomena. They appeal to the mind through the visual-auditory senses (Jain, 2004). There is a famous Chinese proverb "one seeing is worth, a hundred words", it is a fact that we receive knowledge through our senses. There is another proverb that" if we hear, we forget, if we see, we remember, and if we do something, we know it" so it means that use of audio-visual aids in a lesson makes teaching-learning process more effective. According to Kishore (2003), "audio-visual aids stimulate thinking and understanding". The use of audio-visual aids in the teaching-learning process has multifarious values (Mohanty, 2001). The teaching profession is filled with countless opportunities to enrich the academic lives of students, while some concepts and educational objectives will be easy for students to grasp, others will require them to think creatively to ensure that important learning objectives are met. Using audio-visual aids in teaching is one way to enhance lesson plans and give students additional ways to process subject information (Kunari, 2006). According to Lestage (2009), the use of pictures, animations, and sounds can help teachers keep students' interest in the teaching and learning process.

Audio-visual aids or technological media are additional devices that help the teacher to clarify, establish, co-relate and co-ordinate accurate concepts, interpretations and appreciations and enable him/her to make learning more concrete, effective, interesting, inspirational, meaningful and vivid. Audio-visual aids started to be used long before World War II and were recognized as valuable tools in teaching. They help in completing the triangular process of learning; that is motivation, clarification and stimulation (Dale,

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1964). The importance of these audio-visual teaching materials is also stated by Dale (1964), known as the chief exponent of audio-visual aids in teaching. He said that "audio-visual materials give rise to meaningful concepts enriched by meaningful association, hence they offer the best antidote for the disease of verbalism; this is because they supply a concrete basis for conceptual thinking." In addition, Dale (1964) stated that the aim of teaching with this technological media is "clearing the channel between the learner and the things that are worth learning". According to him, the basic assumption underlying audio-visual aids is that learning (clear understanding) stems from sense experience. That is, the teacher must "show" as well as "tell".

Audio-visual aids are anything by means of which learning process may be encouraged or carried on through the sense of hearing or sense of sight (Good & Kappa, 1973). Audio-visual aids are instructional materials and devices for effective teaching and learning. Examples of learning aids include visual aids, audio-visual aids, real objects and many others. Audio-visual aids can be characterized by many kinds of materials; those materials can be classified according to the leaner's sense organs affected by the aids. An aid that has an influence on the auditory sense is called an audio aid which affects the listening and the hearing process like record players. An aid in which the sight sense is involved is called visual aids such as blackboard, maps, photographs, charts etc.

In the third category, the audio-visual aids both the auditory and the sight senses are involved like in television, videos, motion pictures (Rautrao, 2012). Audio-visuals aids were used in the study because they involve the use of sound (using words to communicate) as well as the use of visuals (black-board, maps, photographs, charts, motion pictures) in teaching and learning process. Again,

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audio-visual materials such as videos, images, charts and motion pictures are easily available on the internet.

Significance of audio-visual aids in teaching accounting

According to Kelly and Serb (1961), "the use of audio-visual aids in the classroom will free the teacher from work" (p. 81). Visual perception contributes to about 90% of all human learning. By emphasising whatever is being said, visual aids help reach the targeted objectives. Visual aids make the audience involved and presuppose a change from one activity to another: from hearing to seeing. Upon using visual aids, their use tends to encourage body language and movement on one's part. This added movement helps to give the speaker the control that is needed over the presentation. Using visual aids, then, is beneficial to both the audience and the speaker. Visual aids create influence and excitement to a presentation. They help to target more than one sense simultaneously, therefore increasing the audience's comprehension. With pictures, the concepts or ideas presented are no longer simply words - but words plus images. People tend to be eye-minded, and the impacts visual aids bring to a presentation are crucial. In many studies, experimental psychologists and scholars have found that retention of information three days after a meeting or other event is six times greater when information is presented by visual and oral means than when the information is presented by the spoken word alone.

Components of TPACK

Seven components are included in the TPACK framework. They are defined as:

Technology knowledge (TK): Technology knowledge refers to the knowledge about various technologies, ranging from low-tech technologies such as pencil

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and paper to digital technologies such as the Internet, digital video, interactive whiteboards, and software programs.

Content knowledge (CK): Content knowledge is the "knowledge about actual subject matter that is to be learned or taught" (Mishra & Koehler, 2006, p. 1026). Teachers must know about the content they are going to teach and how the nature of knowledge is different for various content areas.

Pedagogical knowledge (PK): Pedagogical knowledge refers to the methods and processes of teaching and includes knowledge in classroom management, assessment, lesson plan development, and student learning.

Pedagogical content knowledge (PCK): Pedagogical content knowledge refers to the content knowledge that deals with the teaching process (Shulman, 1986). Pedagogical content knowledge is different for various content areas, as it blends both content and pedagogy with the goal being to develop better teaching practices in the content areas.

Technological content knowledge (TCK): Technological content knowledge refers to the knowledge of how technology can create new representations for specific content. It suggests that teachers understand that, by using a specific technology, they can change the way learners practise and understand concepts in a specific content area.

Technological pedagogical knowledge (TPK): Technological pedagogical knowledge refers to the knowledge of how various technologies can be used in teaching, and to understanding that using technology may change the way teachers teach.

Technological pedagogical content knowledge (TPACK): Technological pedagogical content knowledge refers to the knowledge required by teachers for

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integrating technology into their teaching in any content area. Teachers have an intuitive understanding of the complex interplay between the three basic components of knowledge (CK, PK, TK) by teaching content using appropriate pedagogical methods and technologies (Schmidt, Baran, Thompson, Mishra, Koehler & Shin , 2009).

Specific application of TPACK to the study

For the purpose of the study, the components of TPACK were conceptualised as: Technological Knowledge (TK) refers to the knowledge about audio-visual materials. Thus, the pre-service teachers' knowledge of technology in this study was measured in terms of their knowledge about the use of audio-visual aids.

Content Knowledge (CK) refers to the knowledge about the subject (accounting) for which the pre-service accounting teachers are expected to impart into students to bring about positive change in the behaviour of students. The pre-service accounting teachers' content knowledge in the study was measured by their mastery of the subject accounting. That is, the ability of the teachers to explain clearly and apply theories, principles and concepts that are involved in accounting.

Pedagogical Knowledge (PK) refers to the teaching approaches or strategies employed by pre-service teachers in teaching including classroom management strategies and assessment procedures. The pre-service accounting teachers' pedagogical knowledge was measured by their ability to use constructivist pedagogical strategies (active, collaborative, authentic and intentional) in teaching.

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Pedagogical Content Knowledge (PCK) refers to the blend of content and pedagogy to develop better teaching practices. PCK deals with how pedagogy affects the content in the teaching process. The PSATs pedagogical content knowledge in the study was measured by their ability to use constructive pedagogical strategies (active, collaborative, authentic and intentional) in teaching accounting.

Technological Content Knowledge (TCK) refers to the knowledge of how technology can be used to enhance students' understanding of accounting. In this study, technological content knowledge of PSATs was measured by their ability to use audio-visual materials in a manner that changes the way learners practise and understand concepts in accounting.

Technological Pedagogical Knowledge (TPK) refers to the knowledge of how technology can influence the pedagogical strategies used in teaching to enhance students' outcomes. In this study, therefore, the technological pedagogical knowledge of PSATs were measured by their ability to use appropriate technology (audio-visual materials) and the pedagogical strategies (active, collaborative, authentic and intentional) in teaching accounting.

Technological Pedagogical Content Knowledge (TPACK) refers to the knowledge required by pre-service accounting teachers to understand the interplay between technology, pedagogy and content. That is, the ability of the pre-service accounting teachers to combine these three (3) components (technology, pedagogy and content) in teaching accounting in SHS in Ghana. TPACK of the pre-service accounting teachers was measured by their ability to select and use appropriate audio-visual materials to teach concepts in

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accounting in a constructivist (active, collaborative, authentic and intentional) manner.

Barriers to ICT implementation in education

Several potentials of ICT in education especially in making the teaching of accounting interactive and learner-centred have been mentioned in the previous sections. Notwithstanding the emphasis made with respect to ICT's potential for changing the role of the teacher in the classroom, ICT integration as applied to its use for effective teaching is not without limitations. According to Donnelly, McGarr and O'Reilly (2011), there are a lot of barriers to overcome for successful integration of ICT especially, at the post-primary school level of education. Literature highlights different categories in relation to the factors that inhibit teachers from taking up ICT in the classroom. Ertmer (1999), for example, described a simple model that constitutes two types of barriers in this regard; a) first-order barriers, which can be resolved by the provision of money and b) second-order barriers, which Ertmer explains to be deeply tied to teachers' core beliefs. Snoeyink and Ertmer (2001), as stated in Khan, Hasan and Clement (2012), further expanded on Ertmer's first order barriers to include "lack of equipment, the unreliability of equipment, lack of technical support and other resource-related issues". Among all the factors highlighted by Snoeyink and Ertmer (2001), lack of equipment (mostly referred to as lack of ICT resource or infrastructure) has been identified in literature (Agyei, 2012; Donnelly et al., 2011; Khan, et al., 2012) as one of the greatest barriers to ICT integration in the classroom.

Zhao, Pugh, Sheldon and Byers (2002) categorised barriers to technology (ICT) integration into three interactive domains; teacher domain,

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innovative domain, and context domain with a lot of emphasis on the teacher domain in that; it encompasses teacher-biased elements such as technology proficiency, pedagogical compatibility, and social awareness. These seem to echo the important role teachers play in any ICT integration initiative in education. Groff and Mouza (2008) further brought to light (based on literature examined) six critical factors that influence the success of technology integration. These, according to the authors, included: 1). Legislative factors: which entail "… lack of research on the efficacy of technology-based instruction and legislative policy that shifts frequently or is innately designed to facilitate the introduction of technology in the classroom" (Groff & Mouza, 2008).

This definition seems to suggest that the teacher has no control over the legislative factors as barriers and thus, cannot claim any sense of ownership to that effect. 2). District/school-level factors: Authors describe this to constitute "community members and administrators who may push for instructional practices that do not fall in line with research-proven methods and the school environment which may be lacking adequate access to technological and human resources" (Groff & Mouza, 2008). This aligns with Ertmer's first order barrier as it can be addressed financially. 3). Teacher factor: This involves "teacher characteristics such as lack of technology-based skills, attitudes and beliefs that do not favour technology-based learning, concerns towards the introduction of computers, and lack of familiarity with support resources that can prove to be barriers to technology integration in the classroom" (Groff & Mouza, 2008).

It is important to note that, all these factors, as mentioned by the authors, could be classified under Ertmer's first order barriers. Hew and Brush (2007) explained the lack of technology-based skills factor as one of the main reasons

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why teachers shy away from using technology as most of them seem to have gaps in their knowledge where ICT is concerned. The issue of teachers' attitudes is also affirmed in light of Mumtaz's (2000) study which revealed that teachers' attitudes can prevent them from using ICT. This, however, seems to be specific to the case where the teacher's attitude towards ICT is negative as observed in the late '90s by Moseley, Higgins, Bramald, Hardman, Miller, Mroz, and Halligan (1999) that a teacher's attitude, if negative, could serve as a barrier to the integrating process.

Beliefs as a barrier can be explained based on how they are brought into action through practice (Donnelly et al., 2011). These highlights are clear indications that the teacher factor is pedagogical in nature as teachers seem to lack the necessary knowledge and skills that are ICT-related for their uptake of ICT as an instructional tool and thus, poses as a major challenge to success of any ICT initiative and implementation process if underestimated and not attended to with agency. 4). Factors associated with the technology-enhanced project: In the authors' view, these are factors that are innovation-oriented and "can inherently possess barriers to achieving success if it exhibits distance from the school context and dependence on resources outside of the teacher's control" (Groff & Mouza, 2008).

In Zhao et al.'s (2002) view, these two characteristics of a technology-based project are crucial as they have the tendency to greatly influence the possibilities for success. These barriers, as mentioned herein, seem to caution the need to contextualise technology-enhanced projects so that the barriers do not become isolated from the existing instructional context (i.e., the school's culture, value set, teacher current practices and prior experiences, existing

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technologies in the school) as well as available and accessible school resources (Zhao et al., 2002). 5). Student factors (i.e., factors associated with students): This type of barriers was included by authors on the grounds that students are the "primary operators" of "technology innovation" and hence, describe barriers to include factors such as "limited prior experiences with technology-based projects, technology skills, and attitudes and beliefs toward computers" (Groff & Mouza, 2008). This suggests that the learner's satisfaction with technology innovation in terms of how it is used in the classroom cannot be ignored as it goes a long way to influence the implementation process. 6). Factors inherent to the technology itself: This was explained by the authors (Groff & Mouza, 2008) to mean that by its very nature, technology brings its own challenges and therefore, creates its own barriers to success in the classroom. Some of the challenges encountered, according to the authors, included hard drive failures, insufficient memory, computer systems incompatibility with peripherals and software, misplaced, lost or corrupted files (Groff & Mouza, 2008).

In as much as all six factors are deemed critical and important, Groff and colleague pinpoint to the fact that it is not all the factors that teachers have control over. In the authors' view, barriers that are legislatively related as well as those that are inherent to the technology itself cannot be easily manipulated, directly influenced or altered by individual teachers. This suggests that these types of barriers cannot, in any way, be resolved by individual teachers and thus, can be taken to be outside the teacher's domain.

Empirical Evidence

This section presents empirical evidence of the findings of earlier researches that are considered relevant to this study. These earlier research

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findings help put the study in perspective to aid comparison of the findings of this study and conclusions reached in earlier researches. Specifically, the review covers topics such as potentials of ICT (audio-visuals) in teaching, effects of interactive (student-centred) teaching approach on students' learning outcomes and impact of professional development training (PDT) on teacher education.

Audio-visuals (A.V) in teaching

Audio-visual aids are important in the education system because they are those devices which are used in classrooms to enhance the teaching-learning process and make it easier and interesting (Saima, Qadir, & Shazia, 2011). Audio-visual aids are the best tools for making teaching effective and the best in the dissemination of knowledge. Saima, et al., (2011) conducted a study to analyze the effectiveness of audio-visual aids in the teaching-learning process at the university level. Questionnaires were administered to 150 students and 50 teachers. The findings revealed that audio-visuals (i) play an important role in teaching-learning process, (ii) make the teaching-learning process effective, (iii) provide knowledge in depth and detail, (iv) bring change in a classroom environment and (v) motivate teachers and students. The study, therefore, recommended that (1) teachers should be trained to use audio-visual aids (2) University should provide proper facilities with audio-visual aids (3) training should be provided to students for proper use of audio-visual aids.

Another study was conducted by Agama-Sarabia, Trejo-Niño, De-la-Peña-León and Islas-Ortega (2017) on teaching improvement with the use of educational audio-visual material in the curricular subject health-illness process. The study used the PICo method and Health Science Descriptors (DeCS) in English, Spanish and Portuguese. Results of seven experimental and

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quasi-experimental studies showed that audiovisual aids helped in the improvement of declarative, contextual and attitudinal learning, nevertheless, they did not surpass the situated strategies such as simulations, authorized practices and interactive activities. The study concludes that, audio-visual aids as a teaching strategy promote a change from the traditional educational system to an improved way of learning that integrates technological advances and resources to enhance education.

Rautrao (2012) conducted a study on the significance of audio-visual aids in teaching English. According to Rautrao (2012), audio-visual aids are instructional materials and devices through which teaching and learning are done in colleges more effectively. Examples of learning aids include visual aids, audio-visual aids, real objects and many others. Intermediate level students were used for the current study because they were learning all skills of language at the same time, they were familiar with some words, and their English proficiency was enough to speak English and understand the importance of reading comprehension. The students were one experimental group (pre-teaching new vocabulary items via audio-visuals) and one control group (a placebo, teaching L2 reading comprehension via the existing method). The results revealed that approximately 83% of human learning occurs visually, and the remaining 17% through the other senses - 11% through hearing, 3.5% through smell, 1% through taste, and 1.5% through touch. The study concluded that, the use of audio-visual aids would upgrade the teaching of English and give students with learning experiences in active participation in all phases of learning activities.

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Ashaver (2013) found out during investigation on the use of audio-visual materials in the teaching and learning processes in colleges of education and the College of Education Katsina-Alala in particular that, there are numerous benefits that students derive from the use of audio-visual aids, but quick understanding weighed more. Two sets of questionnaires were administered to students and lecturers in order to elucidate the needed information. Percentages and frequencies were used to analyse the results. He indicated in his study that even though colleges' collection of audio-visual materials was fairly adequate, the lecturers in the colleges rarely used audio-visual resources in teaching. The chalkboard was the only audio-visual aid they identified as often used by the lecturers.

Ezeani and Akpotohwo (2014) investigated the role of ICT in the teaching and learning of accounting education courses in the universities offering accounting in Ekiti State. Thirty full-time accounting educators from Ekiti State University and Afe Babalola University in Ado-Ekiti, Ekiti State responded to the questionnaire items. Data collected were analyzed using mean and standard deviation estimates, while t-test was used in testing the only hypothesis raised for the study. The findings of the study revealed that the universities offering accounting education courses in Ekiti State greatly valued the roles of ICT facilities in discharging their academic duties hence ICT facilities usage assists in the development of life and workplace skills of an individual in the work environment. Lai, Yang, and Chen (2007) investigated the possibility of technological support for experiential learning. A learning activity flow (or script) and a mobile technology system were designed to facilitate students in experiential learning. An experiment was conducted on two

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fifth-grade classes at an elementary school. The results indicated that mobile technologies are effective in improving knowledge creation during experiential learning.

ICT in Teaching Accounting Education

Zarel, Kargar and Bazyar (2014) conducted a study on the level at which accounting professors use information technology at Universities. The study applied survey research method by choosing 11 different technologies and sending questionnaire to two groups of professors in MA and PHD courses of state and Azad universities. The measurement tool used in the research was questionnaire, and the population was the professors of MA and PHD of accounting course in state, Azad, Payam-Noor and non-profit universities of Iran. Statistical method used for data analysis was t test. The results indicated that there was a significant difference between uses of above mentioned cases between two groups of accounting professors of MA and PHD courses of state and Azad universities. Practical solution to cover this gap is to use more information technology in accounting education, in order to improve the quality of education.

Taiwo and Edwin (2016) conducted a study to find out the effect of ICT on accounting information system and organizational performance. The study utilized secondary data and Pearson's correlation was used for analysis using SPSS for a sample of 20 staff in financial services and other related accounting departments in Covenant University. The results of the empirical findings showed that there was a significant positive relationship between ICT system and accounting system and a significant positive relationship between ICT and organizational performance.

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Boniface (2016) conducted a study on the integration of ICT software in the teaching of accounting in tertiary institutions in Rivers State. The purpose of the study was to ascertain the extent to which accounting lecturers use ICT in the teaching of accounting in tertiary institutions in Rivers State. The research design was the descriptive survey design and the sample size was seventy (70) accounting lecturers that exist in the five tertiary institutions used for the study. The instrument used was Information and Communication Technology Teaching Accounting of Accounting Questionnaire (ICTTAAQ). The study revealed among other things that accounting lecturers do not make enough use of accounting software in the teaching of accounting. The study recommended that based on the role ICT and accounting software in the improvement of teaching of accounting, management of tertiary institutions should provide ICT tools and accounting libraries, and where they are available, accounting lecturers should utilize them properly to enhance professional competence.

Jebeile and Abeysekera (2010) conducted a study to find out the spread of ICT innovation in accounting education. The purpose of the study was to evaluate the initiation of an interactive online computer-assisted learning module, called WEBLEARN, in an undergraduate introductory accounting course at an Australian university. The aim was to aid students in the preparation of cash flow statements, a topic that from the student perspective is usually considered fairly difficult. Following the pilot of the module, student responses were collected via questionnaire in order to evaluate their perceptions regarding the WEBLEARN module. The results proved to be significant in relation to all four independent variables: relative advantage, compatibility, ease of use, and result demonstrability. The combination of quantitative and qualitative findings

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indicated that the majority of students formed favourable perceptions regarding the relative advantage, compatibility, and ease of using the module, which further translated into positive intentions regarding prospective use of the module as a learning resource.

Ahadiat (2008) conducted a study to find out the wide range of technologies available for use in accounting education, the author tried to determine which technologies have widespread applications for accounting educators. The study's primary purpose was to investigate technologies popular among accounting faculty. Popularity was measured by using a survey instrument for capturing information concerning the extent to which faculty use each technology in accounting education. Questionnaire was used for data collection from a sample size of 800 participants from all 50 states of the United States. The results revealed that, the most frequently used application of technology was e-mail, which faculty used with a frequency of 90.2% for communication with colleagues. The Internet was the second preferred application, chosen by nearly 90% of faculty. The third most popular application was word processing, required by more than 88% of accounting faculty for student assignments.

Wahab, Dangi, Latif, Mad and Noor (2017) conducted a study to measure the students' acceptance about technology based teaching approach, based on past IT experiences, and resulting actual usage of IT in education as well as perceived IT skills developed by the accounting students. Questionnaires were randomly distributed to the accounting students in selected Malaysian public university. The study found a significant positive relationship between the past IT experiences and the acceptance of technology-based

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education as well as the IT skills of the students; and between the usages of computer laboratory with the IT skills of the students.

Challenges of using ICT in teaching

Agyei (2013) conducted a study on the analysis of technology integration in teacher education in Ghana. The study provided a situational analysis of the pedagogical issues associated with Information and Communication Technology (ICT) use in teacher education in Ghana. The methodology used in the study focused on meta-data analysis in which issues associated with integrating ICT in Ghana's education were re-examined to provide a better picture that will support future achievement of teaching and learning with ICT. The evidence suggests that the challenges of ICT use in education do not lie only in the lack of availability of technological resources, but also in the shortage of skilled human resources and other institutional factors. The study concluded that, the challenges of ICT use in education do not lie only in the lack of availability of technological resources, but also in the shortage of skilled human resources and other institutional factors.

Ohiwerei, Ohiole, Azih and Okoli (2013) conducted a study on the problems militating against the utilization of information and communication technology in Nigerian universities where business education programmes are being offered. The study identified problems such as lack of computers, lack of qualified teachers to teach ICT in schools, lack of provision of electricity in schools, lack of internet connectivity and obsolete computers. They recommended that the universities authorities should provide electricity as well as solar generating sets for all the universities and connect all the universities, faculties as well as departments to ICT nation-wide.

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Limited time has also been identified in the literature (Güzel, 2011; Jimoyiannis, 2008; Pelgrum & Plomp, 1991) as one of the principal obstacles to the technology implementation process. Jimoyiannis (2008), for instance, classified time constraints under technical factors that dishearten technology use in the classroom. Pelgrum and Plomp (1991) also identified inadequate preparation time for the development of computer-supported lessons as one of the pressing and occurring factors impeding teachers' willingness to incorporate technology in instruction.

Güzel (2011) revealed time as one of the major barriers to the success of computer-supported lessons. In particular, the study revealed that almost all the participants that were interviewed in the study expressed their concerns about not being able to cover the content of syllabus within the allocated time frame as expected. These literatures herein seem to suggest that ICT when involved in the instructional process usually affects prior lesson preparation as well as the lesson delivery time and thus, does not motivate teachers to want to use technology in the classroom for the fear of not being able to complete the allocated contents they are to cover within stipulated period of time.

The consequence of such inhibition with time especially, in the Ghanaian context, is the tendency for teachers to "reinforce the phenomenon" of "teaching to the test" (Agyei, 2012 p. 40). According to Agyei, this phenomenon instigates teachers to cover topics in a rush with the intent to complete the syllabus in time for examinations without any consideration for meaningful student learning. This suggests that when time becomes a limitation in the ICT integration process "quantity" is given preference over "quality" on

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the part of teachers and hence, makes the change sought with ICT in the educational picture limited.

Student-centred approach

For decades, the student-centred teaching approach, with its conceptual framework based on the constructivism theory (Confer, 2000; Cuban, 2006), has been popular among many educators. Teachers at various grade levels have been applying the student-centred teaching approach for a variety of reasons: to increase student participation (Kelly, 1985), to develop confidence in students (Dandoulakis, 1986), to foster the intellectual development of students (Burke, 1983), to enable students to build multiple historical perspectives (Ogawa, 2001), to improve students' understanding of historical ideas and concepts (Stout, 2004), to shift the learning responsibility to students (Passman, 2000) and so forth. Using technology as a form of constructivist student-centred teaching method was the focus of a large-scale study by Means and Olson (1995). In their study, technology (mainly computers) were used to enhance the restructuring of the classroom around elementary school students' needs and project-based activities. The study revealed that, the effects of technology use included enhanced student work, an increase in student motivation and self-esteem, and changes in student and teacher roles.

A study was conducted by McKean (2014) on the effects of implementing student-centred learning (SCL) in a college at-risk mathematical classroom, and how student-centred teaching strategy affected students' self-efficacy. A triangulation of methods and data were used to examine these effects in two cohorts of students at a large urban college's Academic Upgrading program. The evidence from the study suggested that implementing SCL in

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classrooms for at-risk students is beneficial. The study revealed that increased levels of self-efficacy lead to better mathematical performance and the activities improved students' confidence levels.

Passman (2000) applied the student-centred teaching approach to teaching social studies in the classroom. With this teaching approach, students worked in small groups; the teacher covered the curriculum first; the students then chose a question, did research and discovered the answer, prepared a report and gave presentations in class; they searched school library, internet and classroom resources for information. It was found that 2 student groups gave very impressive and sophisticated presentations on the topics they chose.

Furthermore, studies by (Fink, 2003; Nelson, 2010) all revealed that students in classes where student-centred strategies are used achieve learning outcomes more frequently and to a higher standard than those in instructor-centred. Lea, Stephenson and Troy (2003) reviewed several studies on student-centred learning and found that overall it was an effective approach. A six-year study in Helsinki, which compared traditional and activating instruction, found that the activating group developed better study skills and understanding, but were slower in their study initially (Lonka & Ahola, 1995). Additionally, Hall and Saunders (1997) found that students had increased participation, motivation and grades in a first-year information technology course. In addition, 94% of the students would recommend it to others over the more conventional approach (Hall & Saunders, 1997).

Students in a UK University elaborated on the impact of student-centred learning on them, i.e. they felt there was more respect for the student in this approach, that it was more interesting, exciting, and it boosted their confidence

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(Lea et al., 2003). Overall, it is claimed that a student-centred approach has the potential to enhance "motivation to learn, retention of knowledge, depth of understanding, and appreciation of the subject being taught" (Felder, 1993). As described by (Hall, 2006; Nasir, 2007; Woodward; 2002) and various others, identity is not simply created by oneself. It is a way of locating ourselves and others, formed by an interaction between the self and society.

Focusing on a similar subject, Stout (2004) used the student-centred teaching method to teach 8th-grade US history, which included students analyzing and interpreting the historical documents, working in collaborative teams, presenting their interpretations, and making comparisons. Key findings showed that with an increased sense of confidence in the students and the class being shaped into a community of learners, the students were able to work collaboratively to develop deep understandings of historical content and to negotiate difficult primary source text.

In a study by Wallhead (2004), the student-centred teaching approach mainly involved using the peer-assisted method to learn the tasks of a curriculum unit of sports education. The researcher studied the evolution of the content knowledge of six (6 students. The participants were found to have demonstrated a high level of engagement and compliance with the intended content of the peer-assisted learning tasks. The peer teaching approach was effective in developing the participants' knowledge of lower complexity content.

Semmar (2000) compared the effects of student-centred interactive feedback on students' achievement in writing English as a second language to the writings of those who received standard writing conference input. In the

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study, the student-teacher interactive conference approach was applied as the student-centred teaching method. Semmar (2000) found significant differences between the 2 groups of students' writing texts in favour of the student-teacher interactive feedback approach. In contrast, the group receiving the teacher-centred input did worse in their rewrites.

A close look at the main findings of the studies discussed above seems to reveal that, studies involving the use of multiple student-centred activities, students mainly showed changes in the non-academic areas, such as behaviour, attitudes, interests and self-confidence. However, in the studies that used few student-centred activities, and the teacher played a relatively more active role in giving directions and teaching, students' improvements were mainly in the academic areas. Therefore, based on these findings, it seems fair to say that before one relies on using a highly student-centred teaching approach to generate high levels of learning in various academic subject areas, further study of the issue seems to be reasonably necessary.

Teacher Professional Development Training (PDT)

"Professional development is about teachers learning, learning how to learn, and transforming their knowledge into practice for the benefit of their students' growth. Teacher professional learning is a complex process, which requires cognitive and emotional involvement of teachers individually and collectively, the capacity and willingness to examine where each one stands in terms of convictions and beliefs and the perusal and enactment of appropriate alternatives for improvement or change" (Avalos, 2010, p. 10).

Studies have shown that teachers' professional development programmes played a significant role in the effective integration of ICT in

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education (Ho, Watkins & Kelly, 2001; Hew & Brush, 2007). According to Hew and Brush (2007), teacher training programmes have an impact on teachers' attitudes and conceptions of ICT which helps teachers to acquire necessary knowledge and skills to integrate ICT in teaching and learning situation. A study conducted by Carlson and Gadio (2005) also revealed that traditional one-time teacher training (workshop, short training) programmes are not effective in assisting teachers to build technical competency for using ICT in their teaching-learning situation.

With regard to the focus and main goals of PDT, authors such as Borko (2004) and Desimone, Garet, Porter, Birman and Yoon, (2002) found out that teacher PDT is an essential mechanism for enhancing teachers' knowledge and instructional practices. However, Guskey (2002) study revealed that PDT brings about changes in teachers' attitudes and beliefs. More recently, authors such as Kazemi and Hubbard (2008) and Opfer and Peder (2011) have emphasized the need for more complex understandings, arguing that PDT has the potential to impact many aspects of teachers' professional and personal lives, impacting on teachers' knowledge, competences, and values.

Large-scale survey studies conducted in the United States with teachers from different school subjects' matters; especially mathematics and science have identified a series of features related to the content and design of PDT programs that teachers tend to value positively. Scholars have referred to these features as "features of high-quality PDT" (Garet, Porter, Desimone, Birman & Yoon, 2001; Borko, 2004; Desimone, 2009; Darling-Hammond & McLaughlin, 2011; Bautista, Cañadas, Brizuela, & Schliemann, 2015). According to

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teachers' self-reported data, PD activities that present these features tend to have positive effects on their knowledge and instructional practices.

With regards to content, high-quality PDT focuses on the specific subject matter that the teacher teaches in class (e.g., mathematics, science, history), thereby providing the teacher with deeper understanding of the subject matter itself (content knowledge), of pedagogical strategies to teach that specific content to students (pedagogical knowledge), and of how students think of and learn the content (knowledge of student thinking) (Carpenter, Fennema, Peterson, Chiang, & Loef, 1989; Penuel, Fishman, Yamaguchi, & Gallagher, 2007).

Summary of Literature Review

In this chapter, literature was reviewed with respect to the topic under consideration. The review began with an overview of the concept of teaching in general. Teaching is the process whereby a teacher imparts knowledge, skills, attitudes and values to a learner or group of learners in a way that respects the intellectual integrity and capacity of the learners with the aim of changing the behaviour of the learner(s) (Frimpong, 1990). Teaching, therefore, is a process with distinct stages as well as several components that ensure effective completion of this process (Tamakloe, et al., 2005). This process is carried out in a context where the principal agents are the subject matter, the teacher and the students. According to Tamakloe et al. (2005), these three components or focal points form a triadic relationship.

In addition, the literature review examined ICT's use in education; highlighting its affordances. Audio-visual aids in teaching were also examined by looking at their features and potentials for promoting interactive teaching of

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accounting. Also, the literature on constructivism was reviewed by detailing the constructivist pedagogical strategies (i.e. active, collaborative, authentic and intentional) that promote interactive teaching. The TPACK framework (Mishra & Koehler, 2006) was also examined in the chapter. All the seven components of TPACK were examined and conceptualised in the study. The two theories (constructivist theory and the TPACK framework) informed the proposed conceptualised framework for the study.

The chapter presented a review of the literature on the research approach employed for the current study. The design-based research (DBR) was the approach adopted for the study. Design-based research involves the design, development, and evaluation of an intervention for teaching a concept (Keppell, Au, Ma, & Chan, 2005; Richey & Klein, 2005). Design-based research is a systematic but flexible methodology used to improve educational practices through iterative analysis, design, development, and implementation based on collaboration among researchers and practitioners in natural settings, which result in contextually-sensitive design principles and theories (Wang & Hannafin, 2005).

To some researchers, there are three stages of design-based research; preliminary research phase, prototyping phase, and assessment phase (Plomp, 2010) and to others four stages of design-based research; preliminary, prototyping, assessment, and systematic reflection and documentation stage (Nieveen, et al., 2006). This research approach provided the platform to track how the professional development arrangement adopted for the study was used as a means for understanding pre-service teachers' process of development as

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they strived to integrate ICT (audio-visuals) into teaching of accounting in senior high school in Ghana.

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CHAPTER THREE

RESEARCH METHODS

An Overview

The methods and procedures employed in this study to collect data are presented and discussed in the chapter. The chapter further highlights on the population, sample and sampling procedures, research instruments, data collection and data analysis procedures.

Research Approach

The study employed the design-based research (DBR) approach. A comprehensive definition of design-based research was given by (Van-Den Akker, Gravemeijer, McKenney, & Nieveen 2006) as:

a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories (p. 6)

Another detailed description given by Plomp (2010) is that educational design research is the systematic study of designing, developing, and evaluating educational interventions (programmes, teaching-learning strategies and materials, products, and systems) as solutions to complex problems in educational practice. Design-based research is a methodology designed by and for educators that seeks to increase the impact, transfer, and translation of education research into improved practice. In addition, it stresses the need for theory building and the development of design principles that guide, inform,

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and improve both practice and research in educational contexts (Anderson & Shattuck, 2012).

In a design-based study, one of the main aims is to develop an intervention. The design of these interventions is a key feature of the quality and results of the research project. Brown (2005) who was the first American researcher credited with developing DBR, noted that an effective intervention should be able to migrate teachers from the experimental classroom to average classrooms supported by realistic technological and personal support. Mingfong, et al. (2010) identified four design characteristics that they suggest must be aligned to create effective interventions. These are "frameworks for learning, the affordances of the chosen instructional tools, domain knowledge presentation, and contextual limitations" (Mingfong et al, 2010, p. 470). In DBR, the researcher is careful to document the time, commitment, and contingencies that are involved in the creation and implementation of the intervention. These are documented so that readers of the research can judge for themselves the possibility of achieving similar or even better results from the use of the intervention in their own contexts (Mingfong et al, 2010).

The DBR was used for the study because it does not target the mere implementation of theories, designs, and models in a controlled fashion. Rather, it seeks to improve both theory and the educational context itself (Abdallah & Wegerif, 2014). According to Easterday, Lewis and Gerber (2014), DBR processes consist of 6 iterative phases in which designers: focus the problem, understand the problem, define goals, conceive the outline of a solution, build the solution, and test the solution.

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The first stage of Easterday et al. (2014) DBR process is the focus phase in which designers bind the audience, topic, and scope of the project. The audience specifies whom the product serves, including learners and the other stakeholders affected, such as parents or the community. In this phase, designers specify who is designing the product and their reasons for participating. The topic specifies the general problem the product should address and how it arose. The scope specifies the constraints and scale of the project.

The second stage is the understand phase where designers study learners, domains, contexts and existing solutions. Again, they investigate the problem through empirical methods and secondary sources and synthesize that knowledge into a form that can be easily used later in the process. Empirical methods include quick human-centred techniques such as observation, interviewing, surveys, data analytics. Review of secondary sources focuses on research that helps understand the problem such as models of learning and cultural contexts; analysis of current solutions to similar or related problems; and identification of design principles.

The third stage is the define phase in which designers set goals and assessments. Defining means converting an indeterminate problem, which has no solution, into a determinate problem that can be solved (Buchanan, 1992). According to Easterday et al. (2014), the problem could be defined as a question of "how might we engage students?" or "how might we teach students?" They believe that by completing the sentence "How might we...?" the designer selects a goal from the infinite and unknown number of goals that could be defined. They further explained that only after the goal has been defined can a design be said to succeed or fail. However, they stressed also that, a novel problem

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definition can be the core innovation because it can lead to entirely new kinds of solutions.

The fourth stage is the conceive phase and according to Easterday et al. (2014), it is at this point that designers sketch a plan for the solution. Given a definition (even if implicit), the designer can plan a design intended to reach the goal. This involves imagining a solution and analyzing whether it will work. In this phase, the designer has not committed to implementing the design in a given medium, but rather creates a non-functional, symbolic or graphical representation that allows the designer to conceptually analyze the solution by determining the components of the design and how they might work together. Here, designers also develop theoretical products (diSessa & Cobb, 2004) such as design arguments (Van Den Akker, 1999), the underlying principles of the product, which may be of different levels of complexity (Buchanan, 2001), from communication to artefacts, services, and systems (Penuel, Fishman, Haugan Cheng & Sabelli, 2011). The distinction between the conceive and build phases is between that of a conceptual plan constrained only by the designer's knowledge and that of a concrete prototype that is at least partially functional and constrained by a medium.

The fifth stage is the build phase where designers implement the solution. Once a design has been conceived, the designer can implement the design in a form that can be used. This implementation can be of lower or higher fidelity depending on the stage of the project and the question that the designer wants to test, which may be about a particular aspect of the educational intervention, or whether the educational intervention as conceived can achieve its goal. Easterday, et al (2014) believed that a design must be implemented to

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achieve a goal, and because the design is never completely finished, every implementation provides a prototype that can answer questions about whether the goal has been achieved.

The final stage in Easterday et al, (2014) DBR process is the test phase in which designers evaluate the efficacy of the solution. According to Easterday et al, (2014), iterative user-testing involves testing successive (often parallel) versions of the design at increasing levels of fidelity. Early testing of the plans produced in the conceive phase focuses on questions of relevance and consistency and then later on expected practicality, with expert reviews and walkthroughs. Later testing on prototypes constructed in the build phase focuses on questions of actual practicality and effectiveness using, 1-1, small group, field trials and their variants (Tessmer, 1993).

Testing often uses formative evaluation, which may not establish causality to the extent possible in controlled, randomized experiments, but which can quickly reject bad designs. This increases the likelihood of finding an effective design that can be verified later through summative evaluation. Some consider the boundary between formative and summative evaluation the point at which design research ends and the sciences of the artificial (Simon, 1996), or in this case, rigorous evaluations testing strong causal claims of design principles, begin. Testing provides the designer with feedback about the success of the design and the validity of the theoretical propositions. It tells the designer whether the design has achieved its practical and theoretical goals.

Plomp (2010) also identified the stages of design-based research as a preliminary research phase, prototyping phase, and assessment phase. According to Plomp, the processes involved in the preliminary research phase

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include needs and context analysis, review of related literature, and analysis of curriculum materials. The iterative cycles of the design and development of an intervention to the identified educational problem are carried out at the prototyping stage of design-based research. Nieveen (2010) explained that the iterations help to improve the intervention under development and the tentative design principles. The prototyping phase is built basically on formative evaluation and reflection. This is because there is a high possibility of having the intervention failing at its first implementation, hence the need for revision of some aspects of the intervention (Antwi, 2013).

The iterative nature ensures that satisfying balance is achieved between the intended and the realisation (Plomp, 2010). At the assessment phase of design-based research, summative evaluation exercises are carried out to ascertain the quality of the intervention. Kelly (2010) explained that in design-based research, assessment is not necessarily targeting summation of students' learning. It is, however, a must as researchers should not be only interested in the iterative investigation of the impact of prototyping but to address the issue of how the impact will be measured. That is, the quality of the intervention is the measure of how successful the intervention is with respect to the pre-determined specifications. It should be noted further that the outcomes of the summative assessment are often used to improve upon the quality of the intervention (Plomp, 2010).

Nieveen and her colleagues in their work identified all the three stages (preliminary, prototyping, and assessment) of design-based research of Plomp (2010) in addition to systematic reflection and documentation stage (Nieveen, McKenney, & Van Den Akker, 2006). The added systematic reflection and

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documentation stage is not just a stage in the cyclical design-based research but an ongoing activity that occurs at all cycles during the research work. It was noted by Andriessen (2006) that the process of reflection helps to assess the success of an intervention and the possibility of improving the intervention. However, researchers usually go into retrospection at the end of the research work to analyse and specify the design principles (Nieveen et al., 2006). Thus, in the design-based research process, the findings and any changes so made are documented; and findings are further linked to the process and setting of the design (Wang & Hannafin, 2005).

The current study, however, adopted three (3) iterative phases of design-based research process identified by Easterday, et al (2014) as conceive phase, build phase and the test phase. This is because unlike other design researches in which the identification of the problem is done through conducting a feasibility study or situational analysis study (Agyei, 2012; Nihuka, 2011), this study began with the proof of concept study in which the problem identification and setting of goals were based on the previous researches and in-depth review of literature. This seems to suggest that the first three phases of Easterday et al, (2014) design process were covered through literature review and proof of concept study thus the adaption of the last three phases. According to Plomp (2009), "informed by prior researches and review of relevant literature, researchers in collaboration with practitioners can design and develop workable and effective interventions by carefully studying successive version (or prototypes) of interventions in their target contexts, …" (p. 13).

The purpose of using design-based research for the study in part was to help create a linkage amongst research and practice (Romme, 2003); make

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practical and scientific contributions (Van Den Akker, 2010) to accounting education; and enhance the professional development of the pre-service teachers involved in the study (Andriessen, 2006; Plomp, 2010; Romme, 2003). Another reason for adopting design-based research for the study was to integrate conceptions of designers into the development of instructions or products which are tested in the classroom settings (van den Akker, 2010); help the researcher who has assumed the role of designers to use existing knowledge to design and develop an intervention to problems facing the teaching and learning of accounting, and use theory to provide a rationale for intervention; interpret findings; and develop principles about the process of learning (Mishra & Koehler, 2006).

DBR further helps take care of complexities of classroom teaching and provides researchers with opportunities to study the detailed implementation of interventions with evolving pedagogical goals in rich authentic settings (Mishra & Koehler, 2006). In this study, the Easterday et al's (2014) approach of DBR was adapted and modified to suit the study. The DBR process that was used for the study is presented in Figure 3 below:

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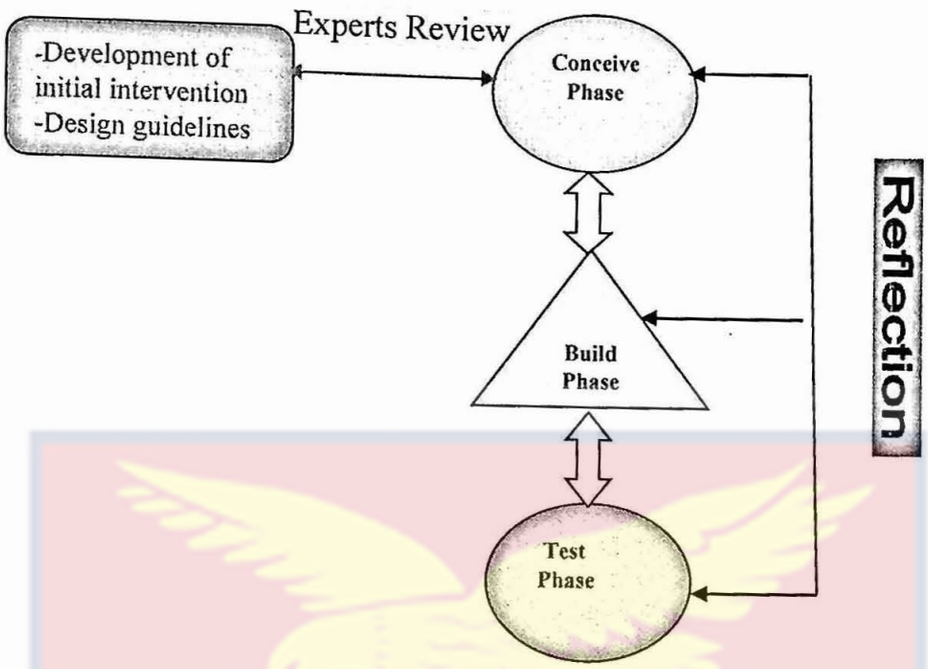


Figure 3: Design-based research process for the study.

Source: (Author's own construct, 2018).

Figure 3 shows the three iterative processes that were involved in the study. The philosophical underpinning for the use of design based research in accounting education is to equip the PSATs to build their capacity in identifying problems in accounting classrooms and finding a workable solution to the problems through the development of interventions. From the diagram above, the initial process started from the conceive phase where through review of literature I developed two exemplary materials for expert review. Thus, initial design guidelines obtained from literature helped in designing the exemplary materials at the conceive phase. The second stage of the process was the build phase where I conducted a professional development training for PSATs to build their capacity to use audio-visual materials in teaching and the third stage of the process was the test phase. At the test phase, PSATs who were involved in the professional development training taught in two senior high schools with their designed intervention. The reason was to test the practicability and utility

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of the intervention in real SHS classroom. At the end of the whole processes, I reflected on all the three (3) phases to document useful design guidelines for possible replication.

Conceive phase

In the conceive phase, through a review of literature, I drafted two model interventions (exemplary materials) for ICT (audio-visual) supported pedagogical strategies for accounting instructions. These initial interventions were developed based on the theoretical, conceptual framework of the study and the design guidelines. I developed two exemplary materials on two of the topics (Accounting Equation and Income Statements). The exemplary materials consisted of two models of ICT-supported lessons (use of audio-visual materials) for teaching accounting in senior high school.

Each of the exemplary materials was developed to cover a period of 120 minutes with students' worksheet and assignment sheet. The first exemplary material was developed for the teaching of SHS 1 accounting topic (Accounting Equation) with the assumption that there was no internet connectivity in the classroom. However, the second exemplary material was developed for the teaching of SHS 2 accounting topic (Income Statements) with the assumption that there were internet connectivity and a computer laboratory. The initial interventions were given to two experts in the areas of ICT and Accounting education to review. Early testing of the plans (exemplary materials) produced in the conceive phase focused on questions of relevance and consistency, and then later on expected practicality, with expert reviews and walkthroughs. The experts' comments were incorporated into the interventions to produce the first draft (See Appendices A1 and A2).

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Build phase

In the build phase, I organized a professional development training (PDT) for the two cohorts of PSATs who participated in the study. The professional development arrangement for this study was in three (3) stages: 1) an introductory workshop for the PSATs of the study, 2) design of ICT-supported lessons by PSATs in groups and 3) implementation of lessons designed by the PSATs. Table 2 presents an overview of the professional development activities for pre-service teachers. The professional development training lasted six (6) weeks and was aimed at preparing the PSATs by giving them the theoretical foundation/concepts as well as practical skills they needed to work successfully during the other stages (design and implementation) of the study.

In the first stage of the training, I selected the first cohort of four PSATs and I introduced them to the overview and conceptual framework of the study including the TPACK framework. They were also introduced to the power-point presentation including how to download and embed videos and images from the internet in a presentation and how to present financial accounting information in excel spreadsheet (see Appendix A1 and A2). As part of the training, I demonstrated to the PSATs how to teach accounting with ICT (audio-visuals) using the exemplary materials developed at the Conceive phase- by highlighting the constructivist pedagogical strategies (active, collaborative, authentic and intentional) for the PSATs to observe in the teaching process. The purpose of the initial try-out (teaching) by the researcher was to enhance the possibilities of transfer and to help the pre-service accounting teachers to develop insight into underlying principles and conditions for their application.

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In the second stage of the professional development (the design stage), the first cohort of PSATs were put into groups of two (G1TR1 and G1TR2, G2TR1 and G2TR2) and they were asked to design their own lessons (lesson plans and students' worksheet) that integrate ICT (audio-visuals) in teaching accounting based on their experiences from the workshops. Each group was given a maximum of one week to design their ICT-based lesson. Two lessons were developed on the topics; Bank Reconciliation Statement (BRS) and Value Added Tax (VAT) by group one (G1TR1 and G1TR2) and group two (G2TR1 and G2TR2) respectively. The purpose of the grouping was to encourage collaboration and teamwork among the PSATs. Table 2 below presents the professional development training activities for the PSATs.

Table 2: Professional Development Training Activities

Week	Facilitator	Topic	Stage
Week 1	Researcher	Overview /rationale of the training	w
Week 1	Researcher	Exposing the pre-service teachers to the conceptual framework of the study	w
Week 2	Researcher	Introduction to TPACK concept	w
Week 2	Researcher	Introduction/demonstration (first teaching) and analysis of the exemplary intervention for teaching accounting	w
Week 3	Researcher	Introduction to PowerPoint presentation (including how to download and embed videos, images from the internet)	w
Week 3	Researcher	Presenting financial information in excel spreadsheet format and how to embed videos and pictures in a presentation.	w
Week 4	Pre-service teachers	Development of ICT (audio-visuals) supported accounting lessons for selected topics	d

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Table 2 continue

Week 5	Pre-service teachers	First teaching try-outs by two pre-service teachers among themselves/researcher	w/I
Week 5	Researcher/ pre-service teachers	Revision of developed lessons by pre-service teachers based on feedback	w/d/i
Week 6	Pre-service teachers	Teaching try-out by two pre-service teachers after possible modifications of the first teaching try-outs to peers/researcher	w/i

Note: w = workshop, d = design, i = implementation

In the third stage of the professional development training (implementation stage), one member from each group taught with their designed ICT-supported lesson among themselves in a micro-teaching session in which data was collected. At the end of the micro-teaching, the researcher together with the four PSATs had a thorough evaluation of their intervention and the teaching process. Based on feedback received from the micro-teaching try-outs, the teams revised their interventions and taught the lessons again in a second teaching try-out among thirty-one (31) students who were their peers (further referred to as student teachers) in a designed classroom situation during an on-campus teaching practice session. In the second teaching try-out, the remaining two members, one from each group who did not teach in the first teaching try-out taught at this stage where data were collected through observation, interview, focused group discussion and questionnaire. Each of the four PSATs taught one out of the four lessons (which lasted for 120 minutes each) although they had worked in teams to design them.

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The student teachers (who served as students in the classrooms) appraised the lessons. The lessons were done in a classroom with an LCD projector and a laptop (PC). The results and insights learned from the teaching try-outs (micro-teaching and classroom implementation) served as necessary inputs for the teachers in revising their designs. The researcher acted mainly as a facilitator, coach and observer in different stages of the study. Each of the peer-teaching sessions was followed by evaluation of the teaching and possible modification of the intervention. The reason for the iteration process was to enable the PSATs to improve upon the deficiencies that the first group of PSATs encountered in their initial teaching try-out. The main focus of the build phase was to improve the intervention and also to check for the practicability of the intervention for teaching accounting.

Test Phase

In the test phase of the study, the main focus was to ascertain the effectiveness and utility of the proposed intervention in the real world situation. At this stage in the study, I selected the second cohort of four PSATs and again, took them through the same processes as the first cohort by first, organizing a workshop (professional development training) for them to understand the theoretical foundation/concepts as well as practical skills they needed to work successfully during the other stages (design and implementation) of the study. I demonstrated to them (by way of teaching) with my exemplary materials and later put them into two groups (G3TR1 and G3TR2, and G4TR1 and G4TR2) and tasked each group to design their own lesson plans that incorporate ICT (audio-visuals) in teaching selected accounting topics based on their experiences from the workshop. Two lessons were designed on the topics;

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Depreciation of Non-Current Assets and Partnership Accounts by (G3TR1 and G3TR2) and (G4TR1 and G4TR2) respectively.

One member from each group taught thirty- one (31) of their peers with their designed ICT-supported lesson during on-campus teaching practice to gather data whilst the remaining two PSATs (G3TR2 and G4TR2) did their teaching try-outs in two Senior High Schools in Cape Coast Metropolis (School A and School B). School A was in (grade A) categories of schools whilst school B was in the (grade C) categories of schools by Ghana Education Service ratings. The reason for the selection of these schools was to find out whether intervention could be implemented in both high and low rated schools. In school A, SHS 2 accounting class was used whilst in school B, SHS 1 accounting class was used for the teaching try-outs. The PSATs (G3TR2 and G4TR2) first conducted a pre-test for the students before teaching the students with their ICT-supported lesson. At the end of the teaching with their ICT-supported lesson, the PSATs conducted a post-test for the students to ascertain whether the ICT intervention had any impact on students' learning outcomes. At the test phase, data was collected through observation, interview and questionnaire which lasted for one week. At the end of the whole process, I analysed the data collected to assess the effectiveness and utility of the intervention in a real-world situation.

Reflection

This is the stage where I had a retrospection of the whole process from the design, development and try-outs of the intervention. The purpose of the reflection of the whole process was to enable the researcher to do an assessment of the design to find out whether the solution or the intervention meets pre-

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determined specifications and also to document final design guidelines and principles for possible replication.

Research Paradigm

The study was rooted in the interpretive paradigm of social constructivism. This study was posited on the assumption that knowledge is socially constructed as individuals seek to make meaning of the world in which they work and live (Creswell, 2007). The study was, therefore, informed by the epistemological position that individuals acquire knowledge and understanding through their experiences and the meanings they derive from and bring to those experiences. As such, those meanings will be multiple and varied. The researcher believed that the PSATs' perceptions of the contribution of ICT to the teaching of accounting in SHS and students experiencing this phenomenon will have different and varied experiences and as such there will be multiple realities. Thus, the study was conducted with the intent of understanding and reporting these multiple realities. To achieve this, data were gathered by engaging participants in face-to-face, open-ended dialogue and this afforded them the opportunity to give a more comprehensive description of their experiences. Using the qualitative method, knowledge was constructed from the meanings and responses obtained from in-depth interviews with the participants. Thus, the qualitative approach enabled the PSATs to provide a detailed description that allowed for a deeper understanding of how the PSATs develop their pedagogical strategies for integrating ICT (audio-visuals) in teaching accounting in Senior High Schools in Ghana.

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Research Design

The study employed the descriptive case study design which sought to explore and understand the meanings PSATs of University of Cape Coast derive from their experience of using ICT (use of audio-visual aids) in teaching accounting. Merriam (1998) asserts that a descriptive case study is one that presents a detailed account of the phenomenon under study and is useful for investigating innovative programmes and practices. Since the study sought to explore how PSATs in University of Cape Coast develop and improve their pedagogical strategies for integrating ICT (use of audio-visual materials) in teaching accounting, a descriptive case study was considered the most appropriate research design for the study.

Generally, case studies are a useful way to systematically look at a specific case, collect data, analyse and interpret findings within their context and report results. According to Yin (1984 p. 23), a case study design is "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used". Yin's definition seems to be in line with how the current study was conducted. This study aimed to explore how ICT (the use of audio-visual materials) can be used in teaching accounting in an interactive way to enhance the teaching and learning of SHS accounting in the context of PSATs at the University of Cape Coast, Ghana in order to understand and track how the PSATs developed their knowledge and skills.

The process involved professional development training through which the PSATs developed ICT-based lessons as an intervention. Yin (2003)

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identified five key elements that dictate the use of a case study research strategy; among which are the research questions and the unit(s) of analysis. For the unit(s) of analysis, Trochim (2000) posits that it is the main entity studied in a case study. In this regard, the case study design was considered appropriate for exploring as well as gaining an in-depth understanding of the phenomenon being investigated in this study; that is, the process of developing PSATs' competencies in the use of ICT (i.e., audio-visuals) for effective teaching of accounting in senior high schools in Ghana. Based on this phenomenon, the PSATs of the study served as the unit of analysis as they were the main entity studied (Trochim, 2000).

The main research question for the study was coined in the form of a "how" question. According to Yin (2003; 2009), a case study is appropriate when the study is purposed to give answers to how, why and where questions (i.e., explanatory questions). Though, the what question is not usually attributed to a case study design, it is believed to be relevant as clarified by when the focus is to address descriptive questions which may also be exploratory.

According to Neale, Thapa, and Boyce (2006), a case study is an approach which describes an intervention purposed to solve a particular problem. Based on Neale, et al (2006) definition of case study, the adoption of a case study design was appropriate as the study described and presented an intervention (ICT-based lessons) that was designed by the PSATs with the intention of providing an alternative and practical solution to the seemly non-interactive and purely teacher-centred approaches that are currently being adopted in Ghana for the teaching of accounting (Ayebi-Arthur & Tenkorang, 2011).

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Participants for the Study

The study engaged PSATs (student-teachers) at level 300 B. Ed Accounting students in the University of Cape Coast in the development of the intervention. In Ghana, University of Cape Coast is one of the universities that train accounting teachers for the senior high schools throughout the country. The overall goal of the B. Ed. Accounting programme is to produce trained and qualified accounting teachers who have adequate subject matter knowledge and can employ critical and reflective thinking in their analysis of educational issues in general and curricular and pedagogical issues. I used the PSATs because I believed that their involvement in the study could enhance their ability to use ICT in teaching accounting in senior high schools upon completion of their programme. This, in a way, can help to improve the teaching and learning of accounting in SHSs in Ghana. Accounting students in SHS 1 and SHS 2 were also involved in the study at the test phase where the interventions were implemented in a real classroom context to assess the effectiveness and utility of the interventions.

Sampling Procedure

Purposive sampling technique was used to select Level 300 B.Ed. Accounting (regular) students for the study. This is because I believed that, students with such characteristics would be able to contribute meaningfully to the study. Also, the convenience sampling technique was employed to select the first eight pre-service accounting teachers (experimental teachers) and twenty-seven students' peers (referred to as student-teachers) (N=35) from a micro-teaching class as they balloted for the topics to teach. These participants were selected based on the criteria that they had been taught "the course methods of

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teaching accounting" in Level 300 and that they had been exposed to various pedagogical strategies for teaching accounting. It is also a requirement as part of the programme for these PSATs to do on-campus teaching practice (micro-teaching) and off-campus teaching practice and I believed that they were the best participants to purposefully inform an understanding of the research problem and central phenomenon in the study (Creswell, 2007).

Data Collection Procedure

Data were collected over a stretch period of five weeks for Phase 1 of the study (i.e from the 11th of March, 2019 to the 12th of April 2019 during the on-campus micro-teaching practice period) and six weeks for Phase 2 of the study (from the 12th of August, 2019 to the 27th of September, 2019). According to Andriessen (2006), in design-based research, a number of research instruments such as interviews, participatory observations, and document analyses could be used to collect data for the study.

For the purpose of this study, data were collected through interview, participatory observation, focused group discussion and questionnaire. Observation and interview guides were designed (see Appendices E, G) respectively and independently reviewed by supervisors before administration. Interviews were conducted over a period of one week and the length of each interview was 25 minutes. Each interview was audio-taped and transcribed for possible analysis. Observations were also conducted in both micro-teaching and off-campus teaching practices by the PSATs to gather first-hand information to augment the data collected through interviewing the PSATs on their experiences with the intervention. Again, data were collected from lesson artefacts such as the lesson plan, presentation slides, and activity sheets developed by the PSATs.

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The questionnaire used in the study included the TPACK self-assessment instrument also referred to as TPACK survey (adapted from Schmidt et al. (2009). This was used to track the change in PSATs developed ICT-oriented knowledge. The questionnaire comprised 44 items (see APPENDIX A1) grouped under seven (7) constructs namely: "Technology Knowledge (TK), Pedagogy Knowledge (PK), Content Knowledge (CK), Pedagogical Content Knowledge (PCK), Technology Content Knowledge (TCK), Technology Pedagogical Knowledge (TPK) and Technological Pedagogical and Content Knowledge (TPACK)".

In particular, TK= 7, PK=7, CK = 5, PCK = 4, TCK = 5, TPK = 9, and TPACK = 8 items. With a Cronbach's alpha reliability estimate ranging from 0.75 to 0.93 (Schmidt et al. 2009), and a construct validity score of 7.88 (Schmidt et al. 2009) for five out of the seven constructs of the TPACK framework, the instrument was considered as valid and reliable. Items were, therefore, adopted and modified specifically to address the integration of audio-visuals in the teaching of accounting. The questionnaire (TPACK survey) was given to the PSATs before and after the professional development training organized for the pre-service teachers. This helped to determine the pre-service teachers' developed knowledge (TPACK) in relation to ICT (audio-visual) integration.

Another questionnaire was used to measure the effectiveness of the intervention designed by the PSATs (see APPENDIX I). This questionnaire comprised 17 items grouped under Active (3 items), Collaborative (6 items), Authentic (4 items) and Intentional (4 items). The effectiveness questionnaire with Cronbach's alpha reliability estimate of 0.726 was considered to be

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reliable. The third questionnaire on students' experiences with the intervention (see APPENDIX J) was designed to include items adapted partly, from Agyei (2012) and items from Koh (2013). The questionnaire was used for two purposes: 1) to gain further insights into how the intervention facilitated and enhanced students' understanding of the accounting concepts taught from the perspective of the students and 2) to ascertain the extent to which the students' perceived the audio-visual interventions to be interactive. With Cronbach's alpha reliability estimate of 0.815, the questionnaire was deemed reliable. This questionnaire also comprised 24 items which were grouped into 3 sub-scales about the students' experiences in relation to their understanding of the audio-visual supported lessons (see APPENDIX J). The sub-scales were: 1) *Interest*- this was aimed at finding out if the lessons engaged the learners' attention; 2) *Comprehension*- this was used to determine how clear and understanding the lessons were, and 3) *Delivery* -this was used to determine whether the content was well explained during the presentation of the audio-visual supported lessons.

The focus group discussion was used to collect data after the first and second teaching try-out sessions in Phase 1 and also, after the first teaching try-out session in Phase 2 where both cohorts of PSATs taught among themselves. Multiple discussion sessions were planned and directed for the PSATs to reflect on the appropriateness of the designed interventions for the selected topics in accounting and the extent to which the interventions promoted interactive teaching. The focus here was on identifying the weaknesses as well as strengths of the interventions and also, providing suggestions in order to improve the intervention. The focus group discussions were also employed during the initial

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stage of the professional development training (PDT) and this helped the PSATs to provide useful feedbacks that were used to refine the intervention.

Semi-structured interviews were employed after each microteaching try-out session during the implementation and evaluation stages for both Phase 1 and Phase 2. This was aimed at gaining insights into how the PSATs advanced in their development in the design and implementation of the intervention. The instrument (i.e., the semi-structured interview guide) was adapted from Agyei (2012). Themes considered in the instrument included: Personal information, Planning and preparation of lesson, During the lesson, Lesson activities, and Post-review of teaching (see APPENDIX G).

Observations were also conducted during the implementation of the intervention to collect data. During the observation process, I used logbook to keep vivid and detailed accounts of the activities and events that occurred during the implementation. The PSATs were observed mainly during the design and enactment of the interventions. Possible areas of concern that I observed included the appropriateness of the audio-visuals selected for specific topics from the Ghanaian SHS accounting curriculum, how the teaching objectives outlined for the designed interventions conformed to the various audio-visual resources employed and the teaching approach adopted.

Data were also collected by the use of pre- and post-tests designed by the second cohort of PSATs in Phase 2 of the study (Test Phase) where the PSATs taught real SHS students in two selected senior high schools (school A and School B). The tests consisted of the same items on the topics: Depreciation of non-current assets and Partnership accounts. I reviewed the test items which were then conducted before (pre) and immediately after (post) each of the two

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lessons taught by Group 3 (G3TR1 and G3TR2) and Group 4 (G4TR1 and G4TR2) respectively. Through simple random sampling, ten students from each school (i.e School A and School B) were selected and interviewed after they had been taught with the ICT intervention. The data collection instruments, as discussed in this section, were used to address mainly research question two (RQ2), research question three (RQ3), and research question four (RQ4) where necessary. However, none of these instruments was used for RQ1 as that was addressed solely based on the literature reviewed in coming up with the initial design guidelines. Table 3 presents a summary of the data collection instruments discussed above and their links to addressing RQ2, RQ3, and RQ4.

Table 3: Summary of Data Collection Instruments for Questions RQ2, RQ3 and RQ4

Research question	Instruments
RQ 2	TPACK self-assessment questionnaire –for pre and post-assessment Observation Guide Semi-structured interview guide Students (experience with intervention) questionnaire Focus group discussion guide Lesson artefacts (e.g., lesson plan documents, activity sheets and presentation slides)
RQ3	TPACK self-assessment questionnaire –for pre and post-assessment Observation Guide Semi-structured interview guide Students (experience with intervention) questionnaire Focus group discussion guide Lesson artefacts (e.g., lesson plan documents, activity sheets and presentation slides) Pre- and post-tests (scores and written responses)
RQ4	TPACK self-assessment questionnaire –for pre and post-assessment Observation Guide Semi-structured interview guide Students (experience with intervention) questionnaire Focus group discussion guide Lesson artefacts (e.g., lesson plan documents, activity sheets and presentation slides)

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Data Processing and Analysis

A combination of qualitative and quantitative methods of analysis was employed due to the use of DBR approach with a descriptive type of case study design. Descriptive statistics, specifically, means and standard deviations were used to analyse the quantitative data from the TPACK self-assessment questionnaire, students' questionnaire (effectiveness of intervention) and the pre- and post-tests. However, factor analysis was employed to analyse the students' experiences with the intervention questionnaire. The analytical instrument used for the quantitave data was the Statistical Product for Service Solution (SPSS) whilst QDA Miner Lite was used for the content analysis. All the questionnaires (TPACK self-assessment questionnaire and the students' questionnaires) were all five-point Likert scale with ranges from strongly disagree (1) to strongly agree (5). An average of 3.5 and above indicated a positive favourable opinion while below 2.5 indicated a negative opinion of the PSATs responses for the TPACK self-assessment and students' questionnaires. Table 4 presents the decision rule for mean values.

Table 4: Decision rule for mean values

Means	Decision
0.0 – 1.4	Strongly Disagree
1.5 – 2.4	Disagree
2.5 – 3.4	Not Sure
3.5 – 4.4	Agree
4.5 – 5.0	Strongly Agree

Source: Fieldwork, 2019.

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The observation data recorded in the researcher's logbook was in the form of a text while data from the semi-structured interview and the focus group discussion were transcribed from audio to text. The observation, semi-structured interview, and focus group discussion data were all analysed by identifying themes as well as patterns in line with the conceptual framework. These themes were then grouped into PSATs' perspectives as they appeared in the semi-structured interviews and discussions to the research questions. Quantitative evidence was presented using tables while themes, verbatim quotations, non-verbal expressions, pictures as well as excerpts from the qualitative data sources were used where necessary to present evidence.

Validity and reliability of the interview guide

To ensure the content validity of the questions on the interview guide, the first draft of the guide was shown to two experts in accounting and ICT education. The suggestions from the experts were used to improve the quality of the items in the interview guide. Internal validity of PSATs' interviews was ensured through credibility where the researcher offered the PSATs opportunity to add further information to what they had given earlier on.

Credibility

A mixture of qualitative and quantitative evidence was used at different stages of the study to facilitate an in-depth understanding of the process of development in the PSATs' TPACK sought in the study. In this regard, multiple data sources and analysis procedures adopted in the study were careful measures taken to ascertain triangulation (Agyei, 2012). In order to ensure honesty on the part of the PSATs who were involved in the study, they were given the

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option to refuse or accept to participate in the study. This was a way of ensuring that only willing PSATs participated in the study.

The participants were encouraged to be truthful and objective during professional development training. I also tried to establish a good rapport with the PSATs in a way that made them feel comfortable and appreciated for being part of the study. To check for contradictory statements as well as falsehoods in the information provided by the PSATs, I adopted the strategy of rephrasing the questions previously asked during the interview sessions. For member checks, transcribed dialogues were given to informants to cross-check and confirm that their words during the focus group discussion and interviews were exactly as they intended at the time of the interview sessions, and accurately captured by me.

Transferability

According to Lincoln and Guba (1985), the underlying idea for transferability is for the researcher conducting a study to make available to readers, detailed description of the phenomenon under study to enable them to make sound judgements that could be applied in other contexts. As the study was time and context-bound, the findings could not be generalised beyond its scope, however, I provided sufficiently vivid descriptions of the context, methodology, and findings of the study to allow readers transfer the details of the study to their own experience.

Ethical Considerations

A number of precautions was taken into consideration to ensure that ethical issues were prioritized. First of all, clearance was sought from the Institutional Review Board, University of Cape Coast (see APPENDIX K). The

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suggestions and comments made by the board were incorporated in the study which helped in shaping the content and protocol of the entire study. Consent was sought from the Head of Department of Business and Social Sciences Education (DoBSSE), UCC. The department issued a letter granting me permission to embark on the study. After the formal letter was issued, I contacted the PSATs who were involved in the study. In order not to force them into participating in the study, they were given Consent Form (see APPENDIX L) to enable them to decide as to whether to participate in the study or not. The participants were informed about the purpose of the investigation and participants were free to withdraw from the study at any time they so wished because participation was voluntary. No pressure, intimidation or fear was put on any respondent just to elicit compliance. For the sake of confidentiality and anonymity, no respondent was requested to write their names, phone numbers or anything that might link the completed form to the responding PSAT.

Summary of the Chapter

This chapter focused on the methods used for conducting the study. The population, the research design, sample and sampling procedure have all been discussed in this chapter. The instruments and the procedure for data collection and data analysis have all been highlighted in this chapter. Interpretivist paradigm was the philosophical basis on which the study was situated, therefore the study was largely qualitative with a Design-Based Research approach and a case study design which is explanatory in nature using qualitative as well as quantitative evidence to track and understand the process of development of the pre-service teachers as they integrated audio-visuals in teaching accounting in an interactive manner.

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CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents the results from the multiple sources of data collected during the professional development arrangement for all two phases of the study. The results of the study are presented in relation to the research questions formulated for the study using tables, pictures, themes as well as excerpts from the qualitative data where necessary. Thus, both qualitative and quantitative evidence were used where appropriate to address the research questions. This was done to ensure triangulation of the data. In addition, the chapter presents the discussion of key findings from the study. In this regard, the results for each research question are discussed in line with the literature reviewed in chapter two and also explained from the perspective of the theoretical underpinnings of the study as a way of ascertaining the significance of the findings.

Overview of the Study

The overall purpose of this study was to assist PSATs to improve on their pedagogical strategies for integrating ICT (the use of audio-visuals) in the teaching of accounting in senior high schools in Ghana to make it more interactive. For the purpose of the study, technology refers to the use of audio-visuals such as images, YouTube videos, animations and the use of application softwares such as PowerPoint presentations and Spreadsheet – excel. The study used a Design-Based Research (DBR) approach with descriptive case study design and employed both qualitative and quantitative evidence of data collection and analysis to understand the process of development of the pre-

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service accounting teachers as they developed and enacted ICT-supported interventions for interactive teaching of accounting.

The quantitative data were analysed by the use of descriptive statistics (i.e., means and standard deviation) while the qualitative data (transcribed interviews and focus group discussions) were analysed by identifying themes as well as patterns. Document analysis was also employed to analyse and give meaning to the word-based data gathered from the pre-service accounting teachers' ICT-supported lesson artefacts (i.e., Activity sheets, lesson plans and presentation slides).

Research Question One (RQ1)

What are the features of ICT intervention that can be designed to fit the realities in the SHS classroom in Ghana in a manner that makes the teaching of accounting interactive?

To address RQ1, the first two drafts of exemplary ICT-supported materials designed and enacted by the researcher were validated by two experts in ICT-education and accounting education and also tried out on two occasions. Based on the feedback received during the try-outs, the draft exemplary materials were improved and came out as the final intervention which I am contending to have the features of pedagogical strategies to promote the teaching of accounting with ICT in the Ghanaian SHS accounting classrooms in an interactive manner. The interactive features of the intervention were therefore deemed important in this study for preparing the participating pre-service accounting teachers to effectively design and implement ICT-supported lessons for the improvement of students' learning outcomes. For this purpose, the first stage (i.e., the conceive phase) considered for the DBR approach served

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as the gateway to answering RQ1; whereby, the literature reviewed in this study was used as a lens to identify the appropriate and interactive features to consider for the development and design of the two exemplary ICT-supported materials. This was essential as it formed the basis for the formulation of the initial design guidelines that governed the development and design of the two exemplary interventions in this study. This was aimed at preparing the pre-service teachers to 1) collectively design their own ICT-supported interventions based on their experience with the exemplary material and 2) inform their use of ICT-supported interventions to teach high school accounting in an interactive manner.

The initial design guidelines that governed the development of the two exemplary ICT-supported materials constituted the following guidelines for development. To design ICT-based intervention for accounting lessons;

1. such intervention should incorporate technology-related features (such as use of audios, videos, animations, pictures and computer application soft-wares) to promote interactivity in the classroom (Zollo & Winter, 2002; Rao & Jyoti, 2012; Rather, 2004).
2. there should be a guided framework to ground the type of knowledge required for ICT integration into the teaching of accounting (Mishra & Koehler, 2006).
3. the intervention should integrate strategies that promote classroom practice to facilitate students conceptual understanding of the subject matter.

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4. the intervention should take into consideration a collaborative approach to learning for the enforcement of teamwork capabilities in learners (Janssen et al., 2010; Vygotsky, 1978; Teasley & Roschelle, 1993).

The design of the two initial exemplary materials (see APPENDIX A1 and A2) was informed by the above initial design guidelines for the study. The initial exemplary materials designed and implemented had the following features: The interventions; 1) were interactive using audio-visual materials (IAVMs); 2) leaned themselves to collaborative learning approach (CLA); 3) were activity-oriented; 4) required the teacher to have knowledge of technology to design and enact ICT lessons and 5) were adaptable in classrooms where there was internet connectivity or where there was no internet connectivity. In the next session, each of the features mentioned above would be discussed in details.

Use of interactive audio-visual materials (IAVM)

Audio-visual support materials were used for the design of the two exemplary materials because they were considered to have the potentials to enhance students' learning outcomes. Again, they were found to be readily available as they are free and can be downloaded from YouTube, Google and other websites to be used offline on a computer. These features make the IAVM suitable, accessible and sustainable for the Ghanaian SHS classroom context. The IAVMs were also seen to be user-friendly (for example computer application soft-wares such as Power-Point and Spreadsheet) mainly because of their different manipulative and interactive interface that allows a user or a learner to easily explore and interact with it in order to discover and learn about its content-driven affordances for the representation of a subject matter of

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choice. Evidence of the IAVM used in the two exemplary materials is discussed in the next session to give an overview of how the affordances of these IAVSMs informed the design of the two exemplary interventions.

Exemplary material (intervention 1)

The first exemplary material was designed for the teaching of the topic: 'The Accounting Equation'. For a student to clearly appreciate and understand the concept of the accounting equation, it is required that the student should fully understand the concept of change of subject from the mathematical perspective and also understand the meaning of asset, liability and capital. The rearrangement of these elements (asset, liability and capital) in an equation form is what constitutes accounting equation. With consideration for time and the realities in the Ghanaian SHS classroom, three specific instructional objectives and two interactive learning objectives (ILOs) were set for the implementation of the exemplary material (intervention 1). These instructional objectives were however adapted from the SHS financial accounting syllabus to ensure that the intervention aligned with the requirements in relation to the accounting content as outlined in the SHS financial accounting syllabus. Figure 4 below shows aspect of the lesson plan document showing the instructional objectives as reflected in the SHS accounting syllabus.

Instructional Objectives	By the end of the lesson, the student will: 1. acquire knowledge of Asset, Liability and Capital 2. appreciate the effects of transactions on Accounting Equation 3. develop skills in classifying assets and liabilities
Interactive learning Objectives	Through the use of Audio-Visual Materials in the lesson, students will be able to: • observe different types of assets and liabilities • state the accounting equation in different forms

Figure 4: Aspect of lesson plan document showing the learning objectives set for the implementation of the exemplary intervention 1.

Source: (Field work, 2019).

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For the above instructional objectives to be achieved in the lesson, the interactive audio-visual supported materials (IAVM) were integrated into the exemplary material because they were considered to have the potentials to enhance the students' learning outcomes. In a traditional accounting classrooms context, accounting teachers usually demonstrate to students the concept of assets, liabilities and capital by merely explaining assets, liabilities and capital with some examples mentioned for students to have an idea of what they are. This approach to teaching sometimes makes accounting teachers deliver their lessons in abstraction where students sometimes have to imagine (picture) some of these assets and liabilities to really appreciate the concept. For example, in a typical SHS accounting lesson, teachers normally describe without showing the state (whether new, depreciated/depleted, damaged) of an asset to students. This method of teaching is usually used because perhaps it is practically impossible for accounting teachers to bring some of these artefacts to the classrooms for demonstration. They turn to explain how mining activities and dumping of refuse on the land continuously causes the land to deplete without showing real images of these activities/practices to students for them to understand the concept of depletion.

However, the use of the IAVMs in the teaching of accounting equation has the potential to present the concepts with vivid experiences from the teaching and learning environment. For example, audio-visual materials were used to represent the elements of the accounting equation where images of assets such as vehicles, furniture, inventories, cash, land and buildings were projected in the lesson. Figure 5 below shows how audio-visual materials were

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used to represent the elements of the accounting equation (asset, liability and capital).

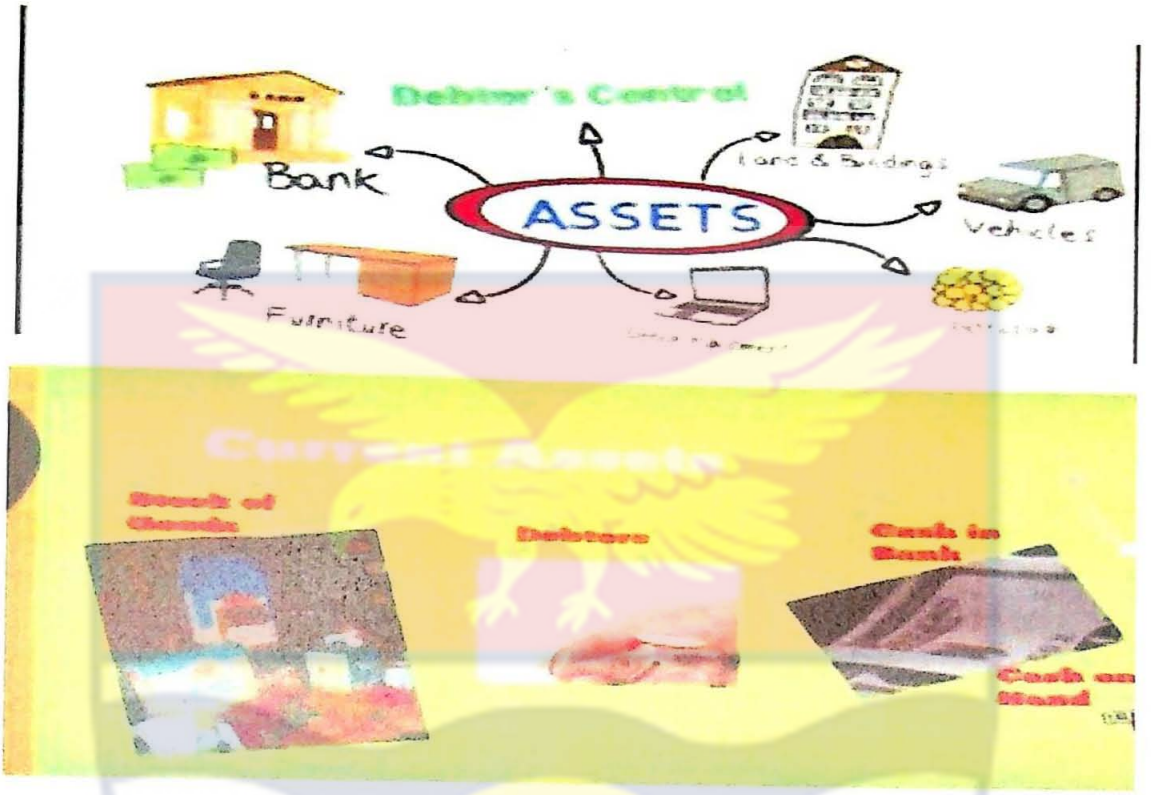


Figure 5: Images of assets from exemplary intervention 1 slides.

Source: (Field work, 2019).

The second exemplary material was designed on the topic: 'Final Accounts of a Sole Proprietorship'. The intervention 2 was designed with the intention of exposing accounting students to the use of spreadsheets (excel) in the computation of gross profit/loss and net profit/loss of a sole trader without the use of calculators. The spreadsheet was considered in the design of the second exemplary because of its exploratory features. The spreadsheet (excel) provides the platform through accounting students can explore and manipulate expenses to see their effect on profit. Figure 6 below shows the instructional objectives for the development of exemplary material 2.

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Instructional Objectives	By the end of the lesson, the student will be able to: 4. perform basic arithmetic calculations (addition, multiplication, subtraction and division) without the use of calculators 5. compute for net sales, net purchases, cost of goods available for sale, cost of sales and the gross profit 6. prepare income statements of a sole proprietorship
Interactive learning Objectives	Through the use of audio-visuals presentations of how to use the Excel – Spreadsheet in teaching accounting, students will be able to: • explore the spreadsheet environment • manipulate accounting figures in the spreadsheet to see its effects

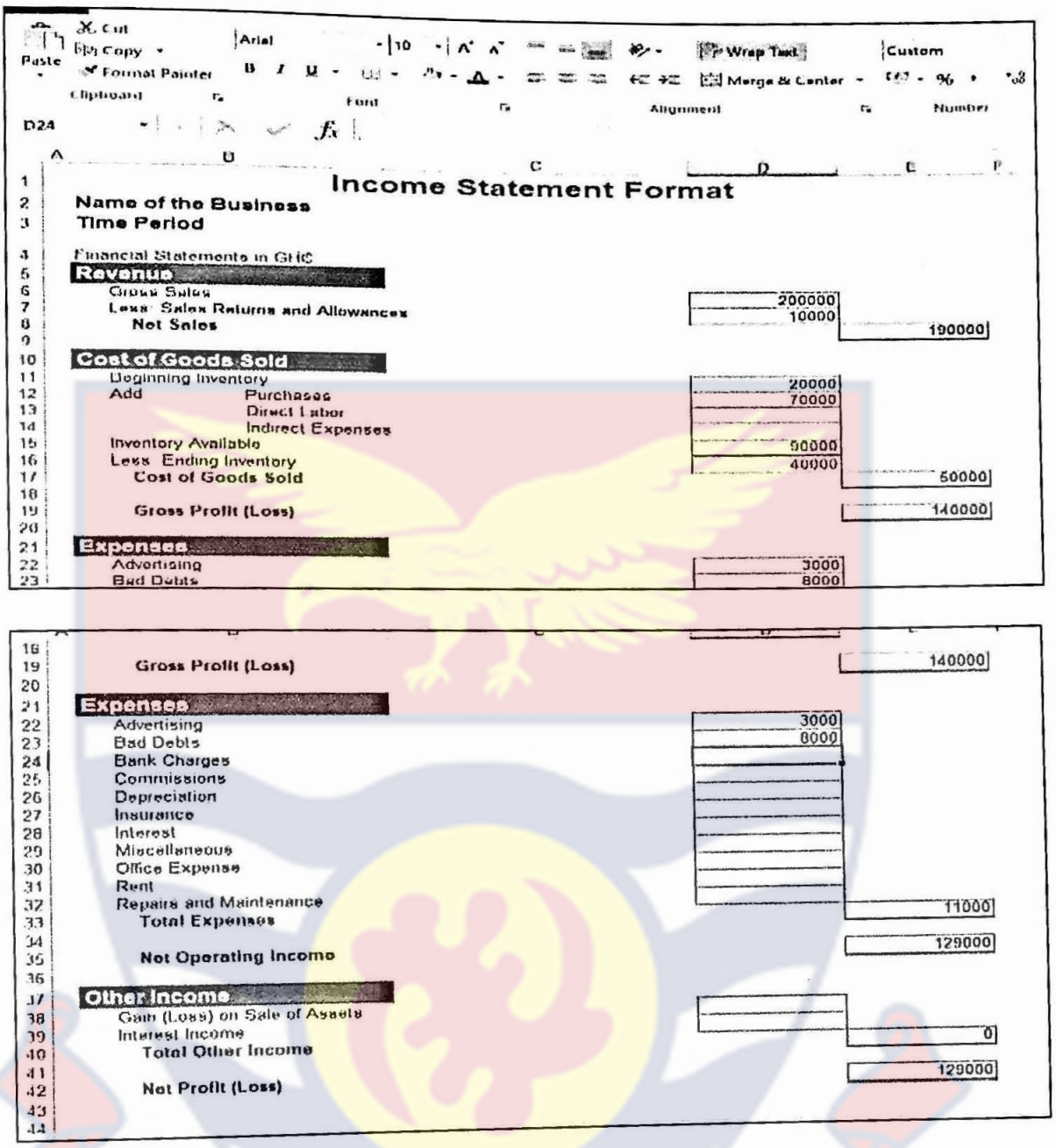
Figure 6: Aspect of lesson plan document showing the learning objectives set for the implementation of the exemplary intervention 2.

Source: (Field work, 2019).

In this exemplary material, the use of excel in teaching final accounts of a sole proprietor will afford students the opportunity to use excel template (format) for the preparation income statements. Accounting students usually memorised the format for the preparation of income statements and when given a trial balance data for a particular sole trader, they try to reproduce the format to compute for gross profit/loss as well as the net profit/loss for a given period. However, in the intervention 2, the interactive audio-visual materials adopted were geared to enhancing students' learning outcomes of the subject matter (the income statement). The spreadsheet has the potential to provide the opportunity for students to explore and interact with the interface of the spreadsheet to obtain an improved understanding of the concepts involved. For example, Figure 7 below presents a snapshot of how the spreadsheet (excel) was used to facilitate the teaching of the income statement.

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	Income Statement Format		
	Name of the Business		
	Time Period		
	Financial Statements in GH¢		
	Revenue		
	Gross Sales	200000	
	Less: Sales Returns and Allowances	10000	
	Net Sales		190000
	Cost of Goods Sold		
	Beginning Inventory	20000	
	Add: Purchases	70000	
	Direct Labor		
	Indirect Expenses		
	Inventory Available	90000	
	Less: Ending Inventory	40000	
	Cost of Goods Sold		50000
	Gross Profit (Loss)		140000
	Expenses		
	Advertising	3000	
	Bad Debts	8000	
	Gross Profit (Loss)		140000
	Expenses		
	Advertising	3000	
	Bad Debts	8000	
	Bank Charges		
	Commissions		
	Depreciation		
	Insurance		
	Interest		
	Miscellaneous		
	Office Expense		
	Rent		
	Repairs and Maintenance		
	Total Expenses		11000
	Net Operating Income		129000
	Other Income		
	Gain (Loss) on Sale of Assets		
	Interest Income		0
	Total Other Income		
	Net Profit (Loss)		129000

Figure 7: Snapshot of the excel template for income statement demonstration in intervention 2

Source: (Field work, 2019).

The income statement format shown in Figure 7 was designed purposefully to engage students to interact with the computer whilst solving for gross profit (loss) or net profit (loss). This excel format for preparing income statement is an editable format that allows students to write any information in the format, add or delete any cell. As students put in the figures in the appropriate cell (for example, when they enter the value of the gross sale and

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the value of sales returns) the spreadsheet automatically performs the necessary calculations for the students. This feature enables students to get more interactive with the computer and also allows students to manipulate the data (expenses) to observe the effect on profit or loss. IAVMs were considered to be useful in the design of the two exemplary materials because of their ability to provide students with enhanced learning outcomes in the teaching and learning environment. This audio-visual is intended to provide the learners with realistic experience, capture their attention and help them to understand the historical phenomena.

The use of IAVMs in the teaching of the accounting equation is likely to create a conducive and interactive teaching and learning environment that will allow students to watch videos, images of various forms of assets, liabilities and capital. The audios, videos and images of different types of assets and liabilities used in the lesson will help to sustain students' interest in the lesson and also retain the concepts in their minds.

Collaborative learning approach features (CLAF)

The collaborative learning approach formed the basis for all classroom arrangements envisaged for promoting divergent knowledge expression with the exemplary interventions. All activities designed on the activity sheet as part of the exemplary interventions were geared towards encouraging teamwork among students in learning the subject matter and providing a platform for discussions as students interact with their peers in the teaching and learning environment. The collaborative learning approach in the classroom context allows students to see their peers as a resource in the classroom rather than a competitor. This implies that students in high collaborative classrooms will

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have no difficulty to share information with their peers in the class. Figure 8 presents a portion of the lesson plan document that portrays evidence of collaborative learning approach features in the exemplary intervention 1.

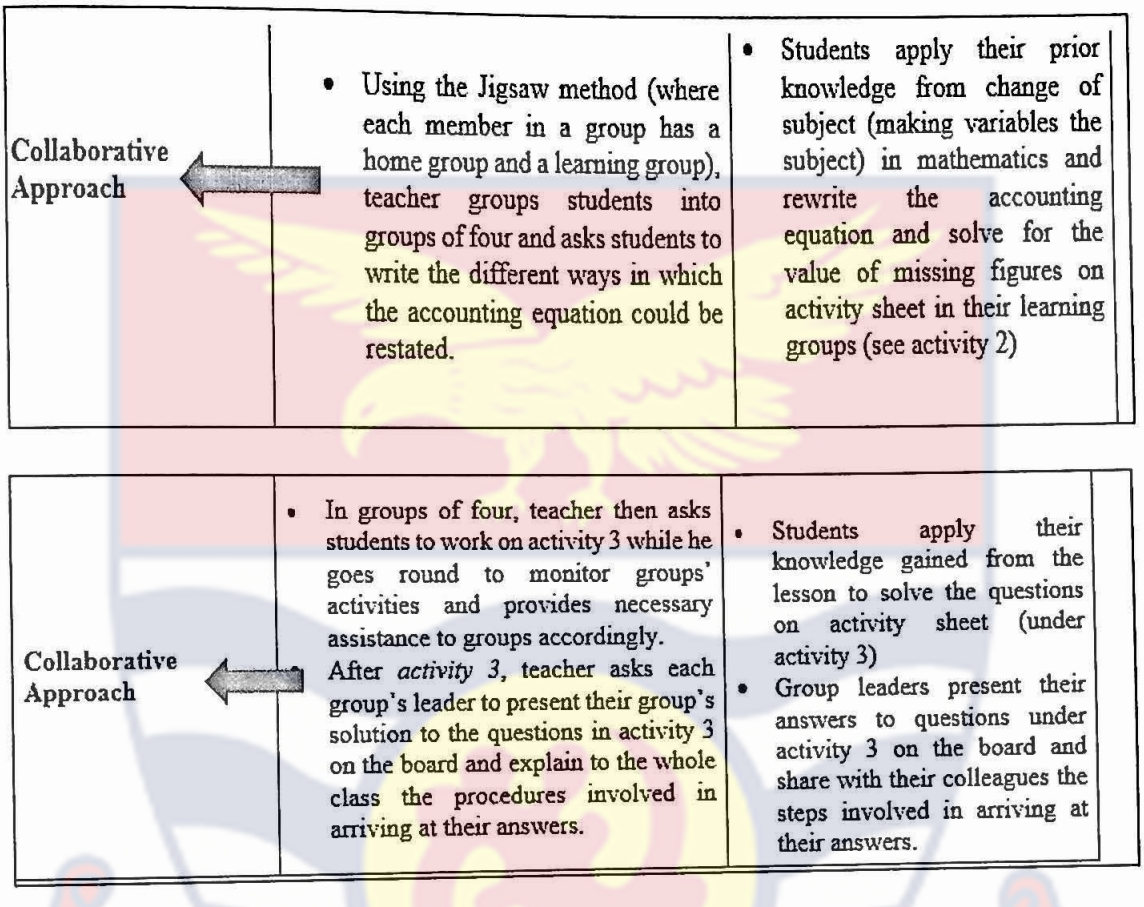


Figure 8: Aspect of lesson plan document showing the use of collaborative learning approach for the implementation of the exemplary intervention 1

Source: (Field work, 2019).

Similarly, the second exemplary material incorporated the collaborative learning approach feature (CLAF) in its design. The CLAF was considered to have the ability to promote teamwork among students which helps students to share ideas and information in the classroom. Figure 9 illustrates the aspect of exemplary intervention 2 that projected the collaborative learning approach feature.

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• Teacher put students into groups of three and tasks each group to calculate for the values of cost of sales and the gross profit/loss from a given data. **Collaborative Approach**	• Students apply their knowledge gained from the lesson to solve the questions on activity sheet (see activity 2) • Students share their ideas by explaining their answers to the questions on the activity sheet under *activity 2* to their colleagues.

Figure 9: Aspect of lesson plan document showing the use of collaborative learning approach for the implementation of the exemplary intervention 2

Source: (Field work, 2019).

The two exemplary materials (interventions) all aimed at equipping accounting teachers in the senior high schools in Ghana to adopt pedagogical strategies that promote collaboration or teamwork in the classroom. Teamwork in the classroom motivates students to share experiences with their peers and also learn from each other.

Activity oriented feature

Another feature of the ICT-supported exemplary material is about its activity-oriented nature. This feature of the intervention aimed at providing the opportunity for students to practise what they are taught during the teaching and learning process. Students learn by doing and therefore the focus of the intervention was to provide the opportunity for students to practise more of the concepts that they are taught in the classroom. To achieve this purpose, for example, the intervention incorporated the use of activity sheets in the design as part of the lesson artefacts. The rationale for the inclusion of the activity sheet section to the ICT-supported pedagogical intervention was deemed necessary because it provides the means to actively engage learners in the teaching and

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learning process. The activity sheets also provide the opportunity for students to become active participants in the classroom by way of solving practical problems together as well as sharing ideas and experiences. The involvement of activities in the interventions also enables the teacher to plan his/her lesson in such a way that the teacher does not dominate in the teaching and learning process. This, in a way, allows the teacher to use more constructivist pedagogical approaches which are more learner-centred in the teaching of the subject matter. The two exemplary materials (intervention 1 and intervention 2) were designed based on the following assumptions;

1. That there are computers and internet facility in the school.
2. That there are no computers and internet facility in the school.

These assumptions were considered for the purpose of providing interventions that are designed to reflect the specific context of a Ghanaian high school accounting classroom where the above two scenarios are possible.

The first exemplary material (intervention 1 see APPENDIX A1) was designed to reflect the situation where there are no computers and no internet resource but only the teacher has access to a computer. This implies that the teacher downloads videos, animations, pictures and other images onto his/her computer to be used offline in the classroom for demonstration purposes through the use of a projector. Figure 10 below shows a portion of the intervention 1 that highlights the first assumption in the intervention.

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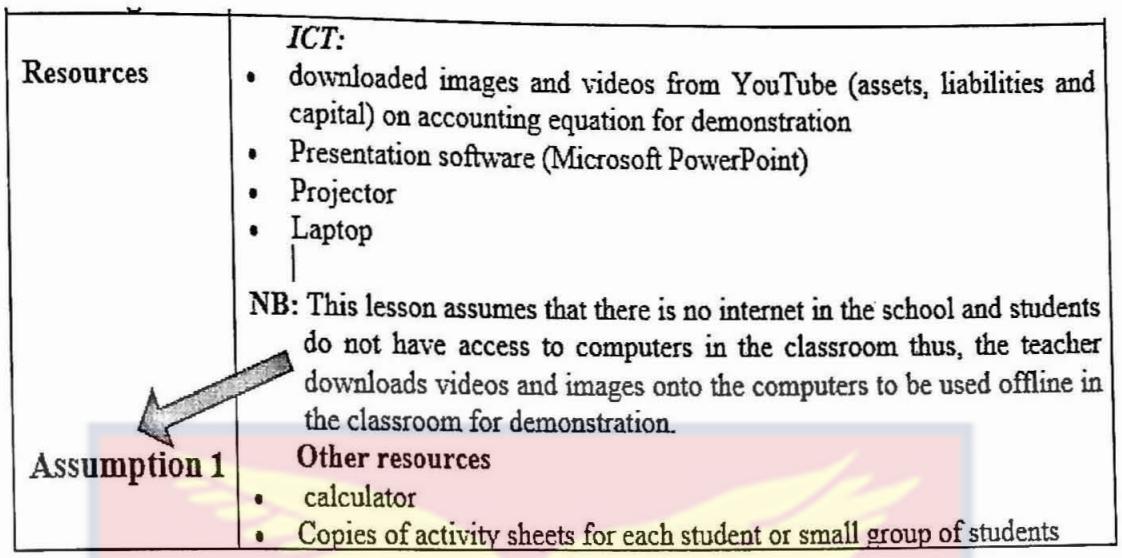


Figure 10: Aspect of lesson plan document showing assumption 1 of the exemplary intervention 1

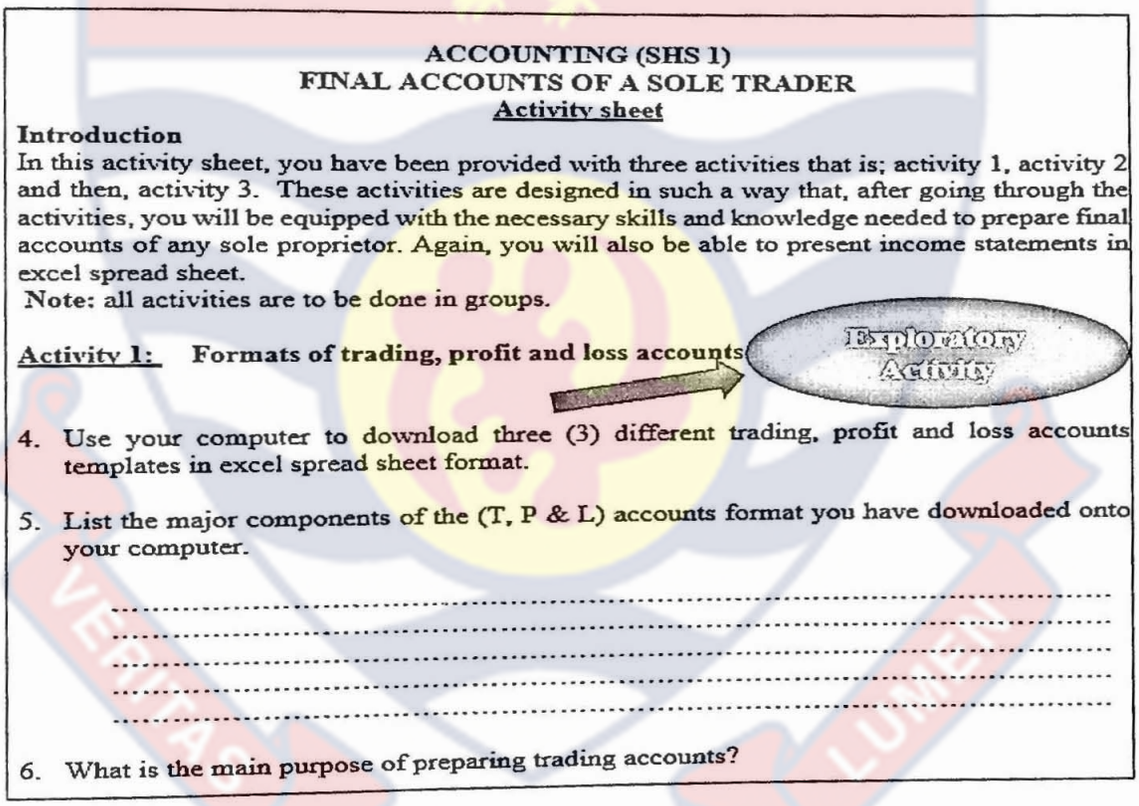
Source: (Field work, 2019).

Due to the fact that students in scenario 1 context do not have access to computers, the activities in the intervention 1 were mostly demonstrative in nature. That is, the teacher presents the activities to the students and allows them some time to work either individually or in groups whilst he/she goes around and monitor students' or groups activities. At the end of the activities, each of the groups demonstrates to the whole class by way of presenting groups' solutions to the activities on the board and also explaining to the whole class the processes involved in arriving at the correct answer. The use of the activity sheets in the intervention was aimed at maximising the potentials of students through teamwork for the enhancement of learners' understanding of concepts in accounting.

The second exemplary material (intervention 2 see APPENDIX A 2) was designed with the assumption that both the teacher and the students have access to computers and internet facility. This exemplary material 2 allows the teacher to prepare his/her lesson without downloading videos and images to be

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used offline in the classroom but rather provides the opportunity for the teacher to demonstrate to students how to download the videos and images that can enhance students' understanding of concepts in accounting. Since the students in this context were assumed to have access to computers in the school where each student sits behind a computer in the teaching and learning process, the activities in the intervention 2 were more of exploratory in nature and provide students the opportunity to interact and explore the computer to gain better experiences and improved learning outcomes. For example, Figure 11 below shows a portion of the activity sheet that projected exploratory activity.



ACCOUNTING (SHS 1)
FINAL ACCOUNTS OF A SOLE TRADER
Activity sheet

Introduction
In this activity sheet, you have been provided with three activities that is; activity 1, activity 2 and then, activity 3. These activities are designed in such a way that, after going through the activities, you will be equipped with the necessary skills and knowledge needed to prepare final accounts of any sole proprietor. Again, you will also be able to present income statements in excel spread sheet.
Note: all activities are to be done in groups.

Activity 1: **Formats of trading, profit and loss accounts**

4. Use your computer to download three (3) different trading, profit and loss accounts templates in excel spread sheet format.
5. List the major components of the (T, P & L) accounts format you have downloaded onto your computer.

.....
.....
.....
.....
.....

6. What is the main purpose of preparing trading accounts?

Figure 11: Aspect of the activity sheet showing exploratory activity in intervention 2

Source: (Field work, 2019).

The two interventions were also designed to reflect the conceptual framework of the study aimed at using constructive pedagogical approaches (active, collaborative, authentic and intentional) in teaching accounting to make

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it more interactive. Interactivity in the study is conceptualised as active, collaborative, authentic and intentional teaching with the use of technology (audio-visual materials). *Active teaching*: refers to the teaching and learning environment in which the teacher prepares and teaches a lesson in such a manner that the students are engaged independently in solving practical problems in the lesson. That is, each student in the class works alone in solving questions on the activity sheet. This provides the opportunity for the teacher to evaluate each student's ability on activities. *Collaborative teaching*: the use of teaching strategies in the classroom that encourage students to work together in groups in solving problems in the lesson. This approach promotes teamwork and also motivates students to share ideas and experiences with their peers in the teaching and learning environment.

Authentic teaching: refers to the teaching of a lesson in a manner that prepares the students to be able to apply the principles and theories in the subject matter to their everyday life experiences. This implies that authentic teaching enables students to relate the concepts in a lesson to the real-life context. *Intentional teaching*: refers to teaching in which the teacher continually monitors students' progress and provides feedback to students in the lesson. In intentional teaching, teachers deliberately set specific objective in mind and devise a means of helping students in achieving those objectives by evaluating students' performances and providing feedback to students for them to identify their strengths and weaknesses on a particular task in the lesson. Figure 12 below shows evidence of analysis of portions of the exemplary material (intervention 1) that projects the constructive pedagogies discussed above.

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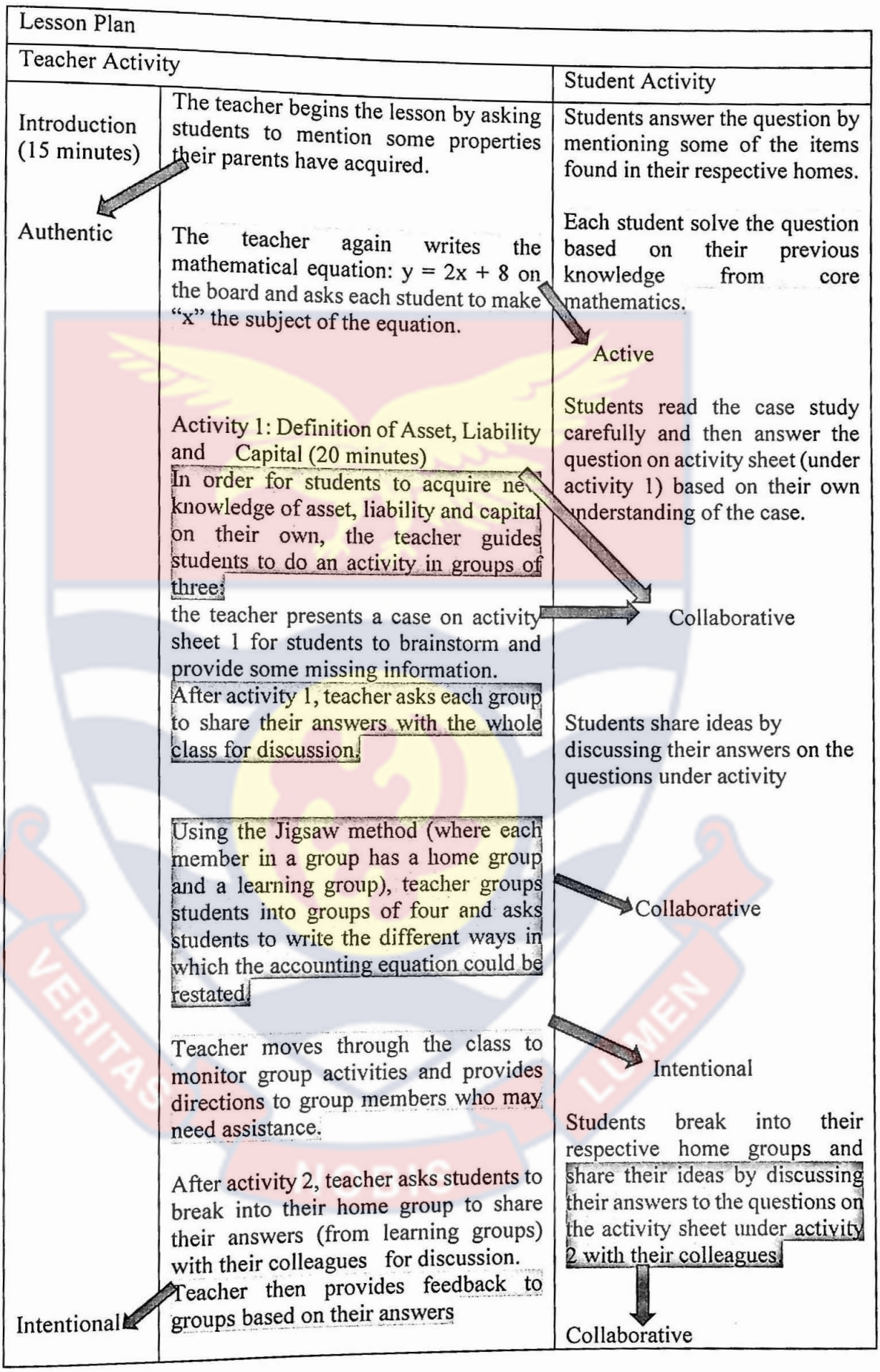


Figure 12: Aspect of lesson plan document showing constructive pedagogies for the implementation of the exemplary intervention 1

Source: (Field work, 2019).

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Technology oriented knowledge feature

At least, a reasonable knowledge about the use of technology (ICT) in teaching is required to develop and enact a successful ICT intervention that can fit the realities in the SHS classroom. For example, the two exemplary materials that were designed and implemented in the study were informed by the TPACK model (i.e., technological pedagogical and content knowledge) as proposed by Mishra and Koehler (2006). The TPACK in the exemplary ICT-supported intervention was envisaged as the integral competency needed by the teacher in using ICT-supported intervention for the creation of an interactive learner-centred teaching and learning atmosphere for teaching accounting in senior high school. In this regard, the TPACK elements formed the core of the exemplary ICT-supported interventions that were designed to fit the Ghanaian SHS accounting classroom.

The TPACK was considered appropriate because of its inherent elements that reflected the teacher's "knowledge and understanding of the interplay between content knowledge (CK), pedagogical knowledge (PK) and technology knowledge (TK)" that is needed to drive the interactive prospect with ICT-intervention for the purpose of stimulating learners to be active, collaborative, authentic and intentional in a constructivist teaching and learning atmosphere. The TPACK elements of the exemplary ICT-supported interventions were incorporated in the design of the activities and hence reflected in the lesson plan document. Figure 13 below shows how the TPACK elements reflected in the exemplary material.

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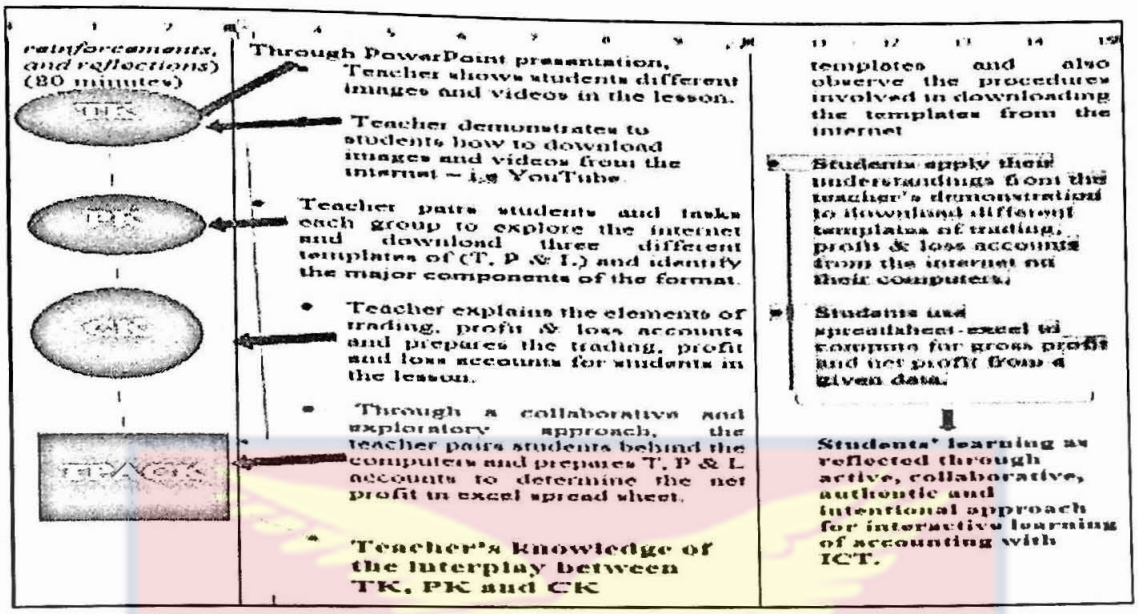


Figure 13: Aspect of lesson plan document showing TPACK elements in the exemplary intervention

Source: (Field work, 2019).

Considering all the features discussed above, the study revealed that the exemplary interventions designed by the researcher were considered to be the ICT intervention that fits the realities of the Ghanaian SHS classroom in a manner that makes the teaching of accounting more interactive.

Research Question Two (RQ 2)

How effective is the ICT intervention in developing pre-service accounting teachers' pedagogical strategies to improve teaching and learning of concepts in accounting?

To answer RQ2, it is important to put into perspective how "effectiveness" of the ICT intervention was conceptualised in this study. Effectiveness of the ICT intervention was conceptualised to mean the extent to which the four constructivist pedagogical strategies (Active, Collaborative, Authentic and Intentional) for interactive teaching and learning were reflected in the design and implementation of the ICT intervention. For the avoidance of doubt; *Active*: refers to the teaching and learning environment in which students

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are engaged independently in solving practical problems in the lesson. *Collaborative*: the use of teaching strategies in the classroom that encourage students to work together in groups in solving problems in the lesson. *Authentic*: students' application of the principles and theories in the subject matter to their everyday life experiences. *Intentional:* teacher continually monitors students' progress and provides feedback on task to students in the lesson.

The effectiveness of the ICT intervention in improving teaching and enhancing students' learning of concepts in accounting was measured and reported at two levels: 1) pre-service teachers' developed pedagogical strategies as obtained from their reported lessons and 2) students' perceptions about the effectiveness of the ICT-supported lessons. The two levels are further discussed in detail in the next session.

Pre-service accounting teachers' developed pedagogical strategies

Pieces of evidence of PSATs developed pedagogical strategies were obtained through observation data, lesson plan documents (activity sheet and presentation slides), focus group discussions and five-point scale survey responses. The implementation of the PSATs' ICT supported pedagogical strategies interventions were in two phases (i.e. phase 1 and phase 2). In each of the phases, there were two cohorts of 4 PSATs and a professional development training (PDT) programmes were organised for each cohort prior to the designing and implementation of the ICT-intervention.

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To promote teamwork among the PSATs, the researcher grouped the PSATs into groups of two (i.e 1st batch: group 1 and group 2, and 2nd batch: group 3 and group 4) with two members in each group. Each group was tasked to develop their own ICT intervention for teaching accounting based on their experiences with the exemplary materials developed by the researcher as well as the knowledge they acquired through the initial workshop. In the phase 1 of the implementation of the ICT intervention by the PSATs, the first batch of the PSATs (one member from each group; i.e. G1T1 and G2T1) taught their lessons in a micro-teaching try-out among themselves whilst the remaining two members (G1T2 and G2T2) did a peer teaching during the on-campus teaching practice session. Figure 14 below shows evidence of peer-teaching try-out by the PSATs.



Figure 14: Pictures of peer teaching session by PSATs (G1 and G2)

Source: (Field work, 2019).

Note: G1T1 = Group1 Teacher 1, G1T2 = Group 1Teacher 2, G2T1 = Group 2 Teacher 1, G2T2 = Group 2 Teacher 2.

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In phase 2 of the study, the 2nd batch of PSATs after going through the PDT (workshops) was also tasked to develop their ICT intervention for the teaching of accounting based on their experiences from the PDT. However, the ICT interventions of the 2nd batch of PSATs (G3T1: G3T2 and G4T1: G4T2) were implemented in two SHS in Cape Coast metropolis (School A and School B). The main reason why the ICT interventions by the PSATs were implemented in two SHS was to test the intervention in a real-life setting to ascertain its effectiveness. Thus, in all, four ICT-supported accounting lessons were designed and implemented by the pre-service teachers in the study. Table 5 below gives an overview of the four ICT-supported accounting lessons.

Table 5: Overview of the Four ICT-Supported Accounting Lessons

Phases of the Study	Phase 1		Phase 2	
Team of PSATs 1st and 2nd batches	Group 1 G1T1, G1T2	Group 2 G2T1, G2T2	Group 3 G3T1, G3T2	Group 4 G4T1, G4T2
Assigned name of ICT intervention	ICT-SAL 1	ICT-SAL 2	ICT-SAL 3	ICT-SAL 4
Topic Taught	Bank Reconciliation Statement	Value Added Tax	Depreciation	Partnership
NIO	3	3	4	3
Lesson Duration	120 Minutes	120 Minutes	120 Minutes	120 Minutes
School Level	SHS 2	SHS 1	SHS 1	SHS 2
No. of Activities	3	3	3	3

ICT-SAL = ICT-support accounting lesson, NIO = Number of instructional objectives

Source: (Field work, 2019).

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The qualitative and quantitative data collected during the development and implementation of the ICT supported pedagogical strategies intervention by the pre-service teachers were analysed to ascertain the effectiveness of ICT-supported intervention. The evidence gathered showed that the ICT-supported intervention for accounting lessons was effective in developing PSATs' pedagogical strategies to improve teaching and learning of concepts in accounting.

All the dimensions of interactive teaching were realised in the interventions designed and enacted by the PSATs. Evidence from the observation data gathered during the implementation of the intervention by the PSATs revealed that they were able to use the ICT-intervention to engage their students independently in learning concepts in accounting (i.e., ACTIVE). Table 6 below shows evidence of the extent to which the pre-service teachers' ICT-intervention were perceived to be interactive.

Table 6: Observation Check List for Accounting Lessons Taught by PSATs

	Group 1		Group 2		Group 3		Group 4	
	Yes	No	Yes	No	Yes	No	Yes	No
The lesson includes a wide range of activities that share the common element of involving students in the lesson	√		√		√		√	
The teacher uses audio-visuals (images, YouTube videos and PowerPoint presentations) to assist students to generate their own ideas based on known concepts in accounting	√		√		√		√	

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Table 6 continue

The lesson provides students with the opportunity to think critically	√	√	√	√
Activities in the lesson helped students to develop a deeper understanding of concepts in accounting	√	√	√	√

Source: (Field work, 2019).

From Table 6, it was observed that all the four teams of PSATs planned their lessons in such a way that students were engaged in the lessons independently on tasks or to construct their own knowledge. I also observed that there were some times in the lesson where the PSATs posed questions for the students to think critically as individuals and provide answers to the questions. This interactive engagement (ACTIVE) in the lessons provided the opportunity for the teacher to evaluate each students' learning ability. This strategy enabled the PSATs to identify students' weaknesses in order to provide assistance to students who may need extra help in the lessons. The active engagement (where students work on task individually) of students in the lesson also helped the teachers to assess each student's performance on activities rather than groups' performance. Figure 15 below provides evidence of students working individually on task.

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Figure 15: Pictures of students working on task individually during the implementation of the intervention

Source: (Field work, 2019).

Interview sessions were organised for the pre-service accounting teachers at the end of each lesson. In the quest to find out from the teachers whether the use of ICT intervention for the teaching of accounting engaged students actively in the lesson, the teachers' responses have been quoted in Table 7 below. The responses were in respect of the question: Describe how you engaged the learners using the audio-visuals in teaching accounting.

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Table 7: PSATS Responses to the Question of How They Engaged Students in the Lesson

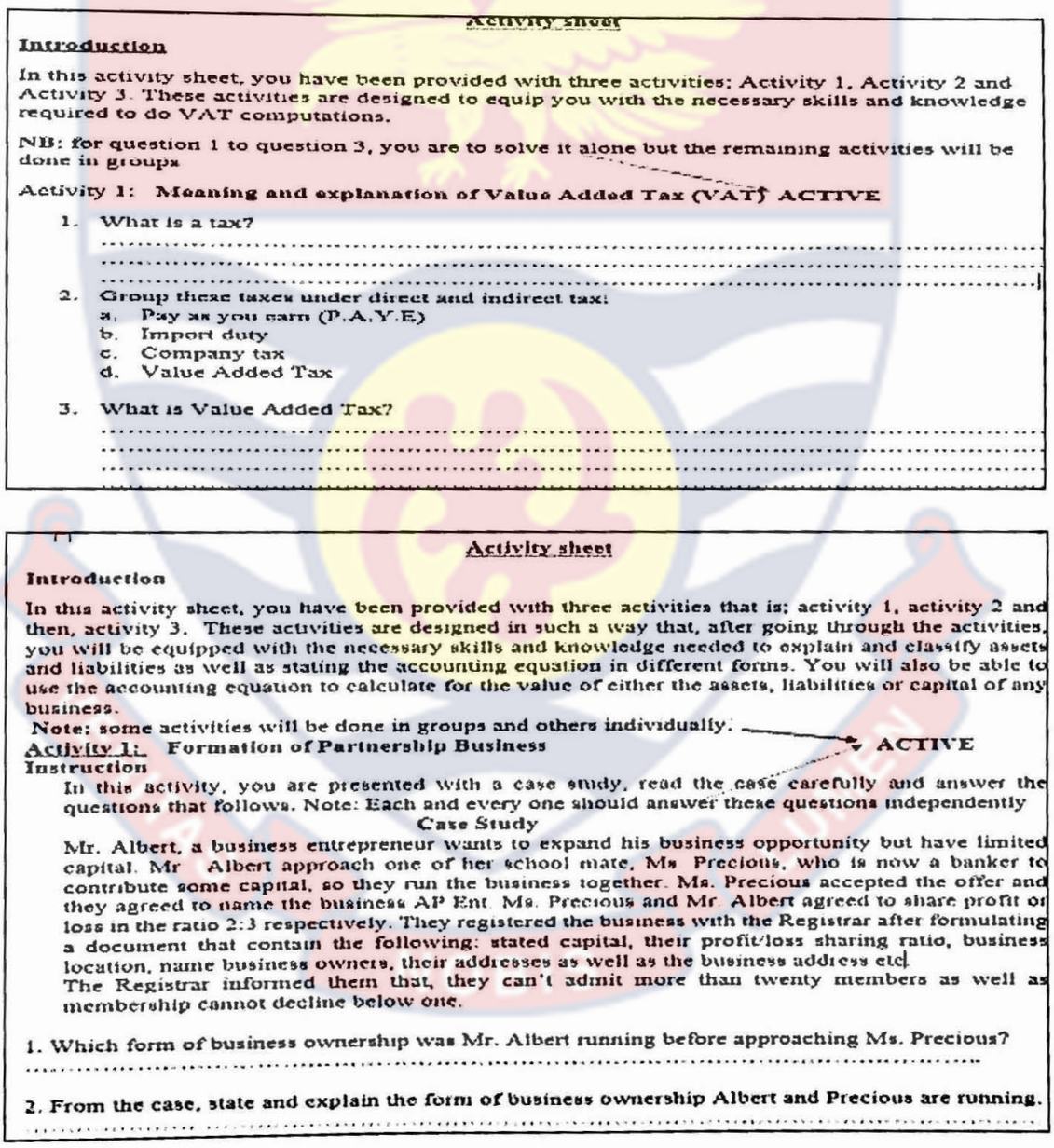
PSATS	PSATS responses (quote responses)
G1TR1	The student watched videos to brainstorms their own ideas The use of images communicated a lot to students The students concentrated on the images and the videos which sustained their attention throughout the lesson.
G2TR 2	Students were engaged with the use of group discussion and students own activities. Due to the use of audio-visuals in the teaching, it made the teaching more student-centred hence, I was just guiding or facilitating the teaching-learning process. Students' attention during the lesson was sumptuous. They were really engaged. They acted differently as compared to other modes of teaching.
G3TR 1	Participation was higher than the traditional settings. Everyone to participated in the lesson by way of watching an image or video to answer a question.
G4TR 1	They were very attentive and wanted to contribute after every video. They liked my approach because they were very attentive when they saw visuals of whatever they were being taught. It was interesting and it felt like watching a movie. They said they will always remember what was shown in the videos.

Source: (Field work, 2019).

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Analysis of the activity sheets also revealed that the ICT-supported intervention promoted the active engagement of students in the teaching and learning of accounting. Even though the majority of the activities were done in groups, there were some activities that required the students to work individually (ACTIVE) in producing the answers to the questions on the activity. Figure 16 below shows the potions of the activity sheet that promoted active engagement of students in the lesson.



Activity sheet

Introduction

In this activity sheet, you have been provided with three activities; Activity 1, Activity 2 and Activity 3. These activities are designed to equip you with the necessary skills and knowledge required to do VAT computations.

NB: for question 1 to question 3, you are to solve it alone but the remaining activities will be done in groups

Activity 1: Meaning and explanation of Value Added Tax (VAT) ACTIVE

1. What is a tax?
   .....
   .....
   .....
2. Group these taxes under direct and indirect tax:
   a. Pay as you earn (P.A.Y.E)
   b. Import duty
   c. Company tax
   d. Value Added Tax
3. What is Value Added Tax?
   .....
   .....
   .....
   .....

Activity sheet

Introduction

In this activity sheet, you have been provided with three activities that is; activity 1, activity 2 and then, activity 3. These activities are designed in such a way that, after going through the activities, you will be equipped with the necessary skills and knowledge needed to explain and classify assets and liabilities as well as stating the accounting equation in different forms. You will also be able to use the accounting equation to calculate for the value of either the assets, liabilities or capital of any business.

Note: some activities will be done in groups and others individually.

Activity 1: Formation of Partnership Business ACTIVE

Instruction

In this activity, you are presented with a case study, read the case carefully and answer the questions that follows. Note: Each and every one should answer these questions independently

Case Study

Mr. Albert, a business entrepreneur wants to expand his business opportunity but have limited capital. Mr Albert approach one of her school mate, Ms Precious, who is now a banker to contribute some capital, so they run the business together. Ms. Precious accepted the offer and they agreed to name the business AP Ent. Ms. Precious and Mr. Albert agreed to share profit or loss in the ratio 2:3 respectively. They registered the business with the Registrar after formulating a document that contain the following: stated capital, their profit/loss sharing ratio, business location, name business owners, their addresses as well as the business address etc.
The Registrar informed them that, they can't admit more than twenty members as well as membership cannot decline below one.

1. Which form of business ownership was Mr. Albert running before approaching Ms. Precious?
   .....
2. From the case, state and explain the form of business ownership Albert and Precious are running.
   .....

Figure 16: Aspect of activity sheets showing active engagement of students in the lesson

Source: (Field work, 2019).

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Evidence from observation, interview, and analysis of activity sheets all point to the fact that PSATs engaged students actively in their lessons by way of assessing each student's performance on task individually.

In the case of the collaborative dimension, the qualitative evidence gathered in this study after the design and implementation of all the four ICT interventions for accounting lessons showed that the pre-service accounting teachers were able to engage students in group work for divergent knowledge expressions where they shared ideas in constructing their own meaning of various concepts in accounting. Evidence gathered from observations, focus group discussion conducted for the PSATs after every micro-teaching try-out and documents analysis (lesson plan, activity sheets and presentation slides) all showed that all the four lessons were highly dominated by collaborative activities where students did a lot of activities in groups. For example, Figure 17 below shows images of students from school A and school B working on a task together in groups.

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Figure 17: Pictures showing students from working in teams on task.

Source: (Field work, 2019).

Again, in the focus group interview conducted for the PSATs, the group agreed that the intervention promoted collaboration among students in the teaching and learning process. This is because in response to the question: In what way did the lesson activities encourage learners to collaboratively construct their understanding of the concept taught? The group decision was that the intervention provided opportunity for students to interact. Some specific responses gathered from the PSATs have been summarised as;

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G1TR1: *The lesson activities performed in groups. This encouraged students to share ideas hence, they were able to construct their own understanding through the knowledge shared.*

G2TR2: *Participation was higher than the traditional settings and students were happy and motivated when working in teams in solving the activities.*

G3TR 2: *Most of the activities undertaken were done in groups for students to interact and share ideas with each other. Through this approach, most of the students were able to learn from each other.*

G4TR1: *The class was very interactive and collaborative and the use of audio-visual made the class interesting. The use of the videos and pictures in the lesson sustained students' attention in the lesson and students were put in various groups to perform various activities and shared varied option'*

Analysis of the activity sheets used by the PSATs in their lessons further show clearly that the ICT interventions for teaching accounting projected more of the collaborative features than the other dimensions; (i.e. active, authentic and intentional). This is because the teachers designed most of the activities in such a way that, students would be encouraged to work in teams in providing answers to the questions in the activities. Students working in groups in the classroom help them to share ideas about an issue and also appreciate the fact that there are different ways of solving one single problem. It also creates an atmosphere where students interact with each other in the teaching and learning

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process which helps students to accept each other's strengths and weaknesses in the classroom and how they can collectively assist each other to improve on their weaknesses as team members. Collaborative learning has potential benefits for cognitive and metacognitive achievement, while its effectiveness depends on factors such as group members' prior knowledge, the composition of the group and the quality of explanations. Figure 18 below shows some aspects of the PSATs designed ICT-interventions that portray interactivity through collaborative efforts among students in the classroom.

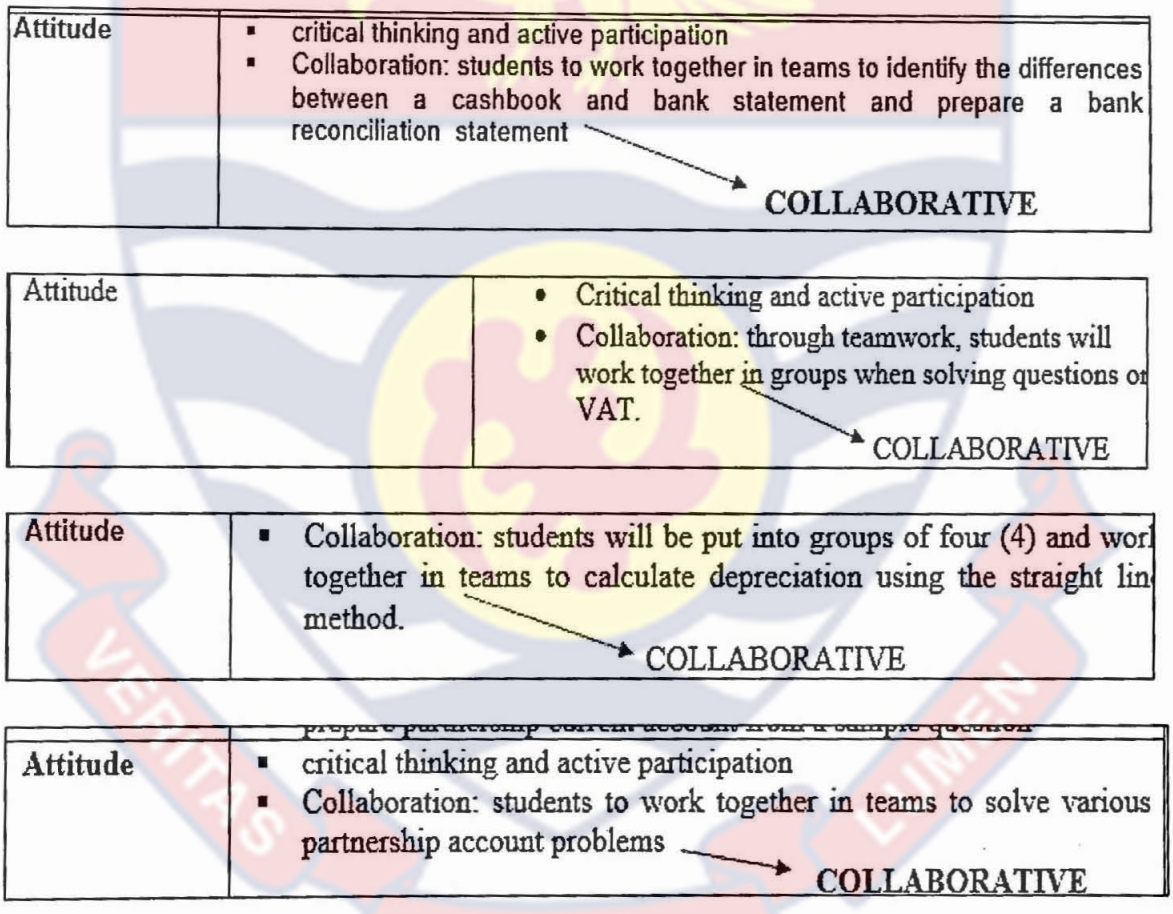


Figure 18: Collaborative dimensions in lesson plan documents of all the four interventions

Source: (Field work, 2019).

Authentic focused on how the pre-service accounting teachers designed ICT-supported interventions connect the lesson to a real-life context. Research has shown that learning proceeds faster when the learners can connect what they

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learn in the classroom to their everyday life experiences. This implies that authentic lessons should equip students to be able to apply the concepts, principles and theories learnt in the classroom to solve real-life problems as they meet them in their everyday experiences. Evidence gathered during the implementation of the ICT-supported interventions indicates that the PSATs were able to connect the lessons to a real-world situation and this helped the students to realise the importance of what they were learning beyond the classroom. For example, Table 8 below shows an aspect of the observation checklist that was used to measure the authenticity of the lessons taught by the PSATs.

Table 8: Observation Check List for (Authentic) Dimensions in the Lessons Taught by PSATs

	Group 1		Group 2		Group 3		Group 4	
	YES	NO	YES	NO	YES	NO	YES	NO
Learning experiences in the lesson mirror the complexities of real life.	√		√		√		√	
The activities in the lesson encouraged students to develop problem-solving skills for their everyday life	√		√		√		√	
Learning environment prepares learners for real-life situations	√		√		√		√	
The use of audio-visuals in the lesson create a learning environment that provides students with rich experiences	√		√		√		√	

Source: Fieldwork 2019

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Through the use of audio-visual materials in the lesson, the pre-service accounting teachers were able to connect some of the concepts in the topics to the real-life experience for the students to appreciate the connectedness between what they learn in the classroom and what happens in the real world situation. The PSATs were able to achieve that by showing videos and images of things that students were familiar with in their everyday life experiences and established the linkage between the images and the concepts in the topics. For example, the images below in Figure 19 were some of the pictures used by the pre-service teachers to demonstrate the connection between what students learn in the classroom and what really happens in the real-world context.

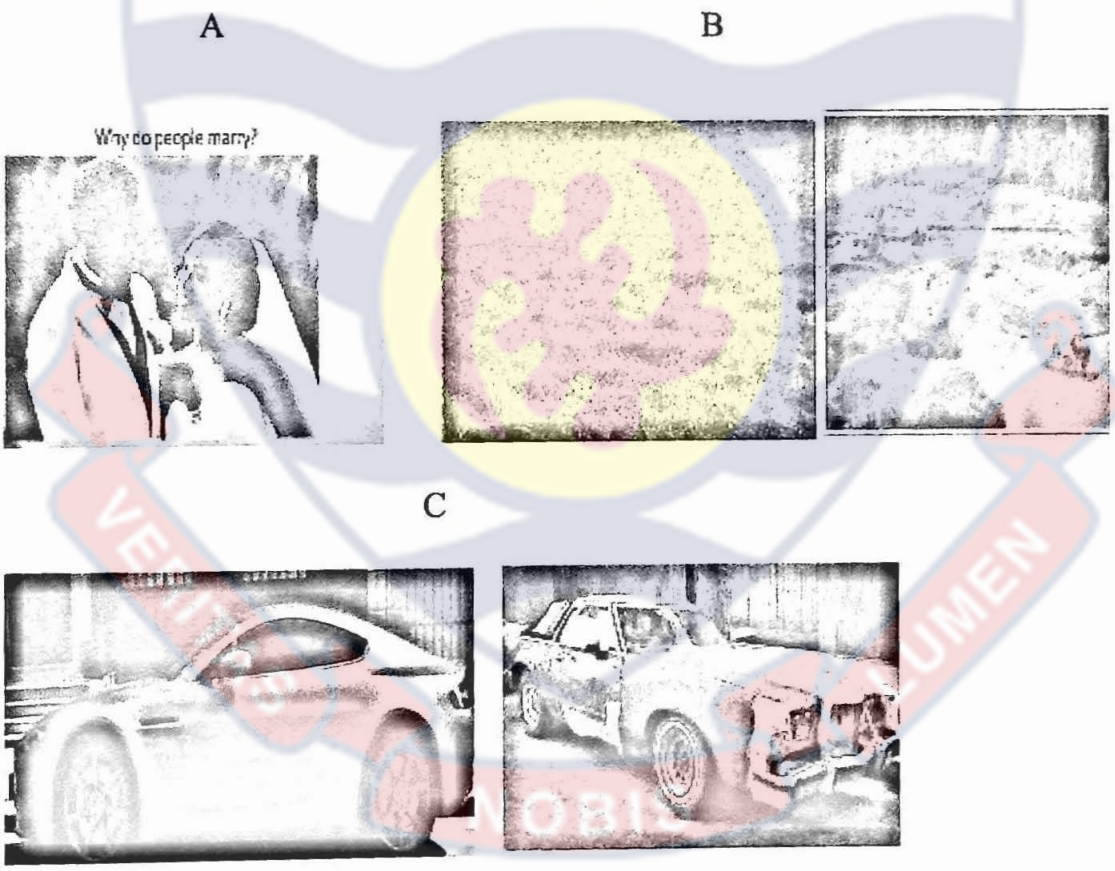


Figure 19: Some of the images used in teaching partnership accounts and depreciation of non-current assets

Source: (Field work, 2019).

From Figure 19 above, image A used to demonstrate concepts in teaching partnership accounts whilst the images in B and C were used to

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illustrate how assets such as land deplete as a result of some human activities during the teaching of depreciation of non-current assets. The students understanding of the concepts involved in the topics were enhanced through the watching of videos and images during the lesson presentations. Unlike in the traditional accounting lessons where accounting teachers would have only mentioned some of the concepts involved in teaching partnership accounts and depreciation, the students had a pictorial view of real images of some of the concepts which research has shown aids in students' retention of concepts learnt in the classroom. The use of audio-visuals in the teaching and learning process made it possible for the PSATs to project some obsolete assets like cars and buildings which would have been difficult to present in the classroom for demonstration.

Analysis of the activity sheets also shows evidence of the authenticity of the lesson taught by the pre-service accounting teachers. The PSATs designed some of the tasks on the activity sheets to reflect the real-life problems. This created a teaching and learning environment that mirrored the complexities of the everyday life experiences of the learners. As the students solved the tasks on the activity sheets which were designed to mirror the real-life experiences, they developed their problem-solving skills which could help them to solve real problems as they meet them in real life context beyond the classroom scenario. Figure 20 below shows aspects of the lesson plan document that projected authentic dimension in the lessons taught by the PSATs during the implementation of the ICT supported intervention for accounting lessons.

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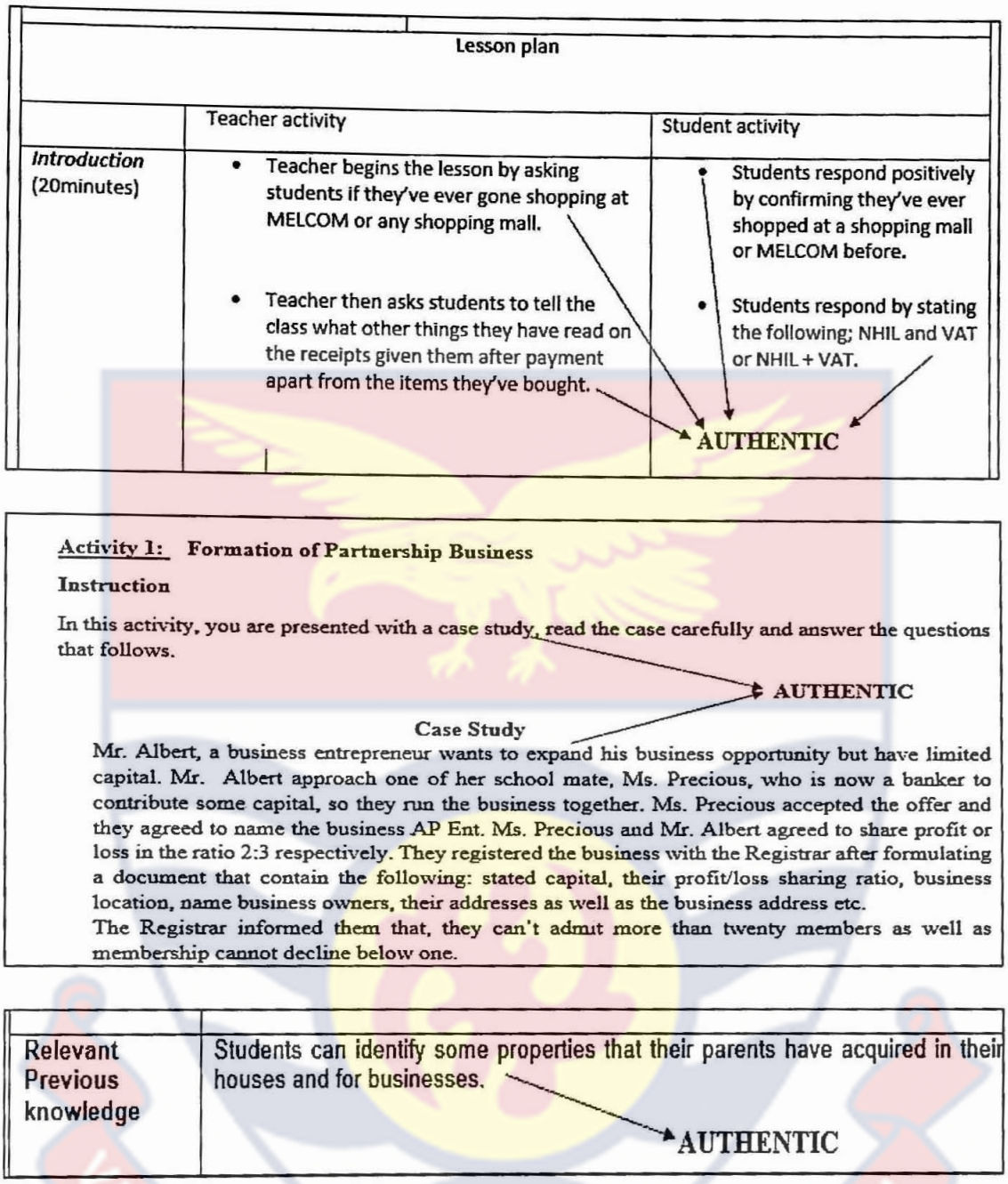


Figure 20: Aspects of the PSATs ICT-interventions that project authentic dimension

Source: (Field work, 2019).

Intentional teaching was conceptualized in the study to mean a situation in the teaching and learning process where teachers act purposefully with specific outcomes or goals in mind for students' development and learning. Intentional acts originate from careful thought and are accompanied by consideration of their potential effects. Thus, an "intentional" teacher aims at: clearly defining learning objectives for students, employing instructional

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strategies likely to help students achieve the objectives, and continually assessing the progress of students in order to provide constructive feedback to students on their performance on a task.

Observation evidence gathered during the implementation of the ICT-supported intervention indicates that the pre-service accounting teachers shared instructional objectives with the students during the lesson presentation. The PSATs also monitored students' activities and provided feedback on tasks to students for them to identify their strengths and weaknesses on a specific task. Figure 21 below shows pictures of PSATs monitoring and providing feedback to students during the implementation of the ICT-intervention.



Figure 21: Pictures showing PSATs monitoring students' activities.

Source: (Field work, 2019).

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Students' perceptions about the effectiveness of the ICT-supported lessons

The effectiveness of the ICT-supported intervention for accounting lessons was also measured quantitatively by the use of five-point Liker's students' survey data (see APPENDIX I). Analyses in this regard validated the qualitative evidence discussed in the previous session. The survey consisted of seventeen items that were grouped under the Active (3 items), Collaborative (6 items), Authentic (4 items) and Intentional (4 items) dimensions. Possible answers to items on the five-dimension questionnaire were on a scale ranging from strongly disagree (1) to strongly agree (5). Table 9 below presents the mean scores of the students' responses.

Table 9: Students' Perceived Effectiveness of the ICT Intervention for Accounting Lessons

Dimension	Mean	Standard Deviation
Active	4.54	.75
Authentic	4.26	.86
Collaborative	4.44	.78
Intentional	4.36	.84
Grand Mean	4.40	0.81

Source: Fieldwork, 2019

From the students' point of view, as reported in Table 9, it can be observed that, in terms of the effectiveness of the ICT intervention, the Active dimension recorded the highest mean value (M = 4.54, SD = .75), this was followed by Collaborative (M = 4.44, SD = .78). The high mean scores for (Active and Collaborative) dimensions were also confirmed by the observation and interview data collected during the study. I observed during the

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implementation that the ICT-based lessons designed by the PSATs involved a lot of activities and most of these activities were done in groups which projected more of the Active and Collaborative features than the Authentic and Intentional features. It must also be indicated that Authentic is the dimension that recorded the lowest mean (M = 4.26, SD = .86). This means that it appears the PSATs had difficulty in relating the concepts in accounting to real-life experiences.

However, in general, an overall mean of (M = 4.40, SD = .81) was recorded indicating that the respondents agreed that the ICT-supported intervention was effective although the standard deviation suggests that the responses were not clustered around the mean value. The overall picture, as presented in the above analysis, indicates that the ICT-based lessons designed by the pre-service accounting teachers were effective (i.e., projected all the four dimensions of interactive teaching). This seems to suggest that the ICT-intervention for accounting lessons was effective in developing pre-service accounting teachers' pedagogical strategies to improve teaching and learning of concepts in accounting.

Research Question Three (RQ 3)

How can the improvements in teaching using ICT-supported pedagogical strategies be understood and or explained?

In order to answer RQ3, both quantitative and qualitative data were collected to explain the improvements in teaching using ICT supported pedagogical strategies in teaching accounting. Based on the data obtained from the study, the improvements in teaching using ICT supported pedagogies can be understood and or explained from two main perspectives; 1) pre-service accounting teachers' developed knowledge and skills in enacting ICT supported

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lessons and 2) pre-service accounting teachers' improved content knowledge in the subject matter. The two perspectives are further explained in the section below.

Pre-service accounting teachers' developed knowledge and skills in enacting ICT- supported lessons

Both qualitative and quantitative data analysed to track the development of knowledge and skills in enacting ICT supported lessons by pre-service accounting teachers revealed that, the development of knowledge and skills by the pre-service accounting teachers was reflected through their developed TPACK. As reported in chapter 3 under the second stage of the study (Build Phase), professional development trainings were organised for the two cohorts of pre-service accounting teachers. Based on their experiences, they were tasked to design and implement their own ICT based intervention for accounting lessons. The lesson plan documents, interviews, focus group discussions and TPACK self-assessment questionnaire were used to evaluate the pre-service teachers' knowledge and skills in enacting ICT-supported lessons. Analysis of the ICT based lessons designed and implemented by the pre-service teachers' revealed evidence of technology-oriented lessons.

For example, the lesson plan documents which were designed by group 4 (G4TR1 and G4TR2) and group 3 (G3TR1 and G3TR2) for the teaching of the topics: Partnership accounts and Depreciation of non-current assets respectively showed evidence (see Figure 22 and Figure 23) of how the pre-service teachers developed their competencies for teaching senior high school accounting with ICT. The PSATs in group 1 (G1TR1 and G1TR2) used their knowledge of the affordances of technology to 1) guide learners in acquiring

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knowledge through the use of videos, animations and images of concepts in the topic (i.e. making use of their TK), 2) represent concepts in accounting (associated with the topic: Partnership accounts) in order to stimulate learners' thinking abilities and enhance their understanding of concepts in accounting (i.e. making use of their TCK), and 3) facilitate their way of teaching in a manner that is interactive (i.e. making use of their TPK). Figure 22 below illustrates how the pre-service teachers' in group 4 (G4TR1 and G4TR2) developed TPACK as seen in their lesson plan informed their teaching of accounting in the senior high school.

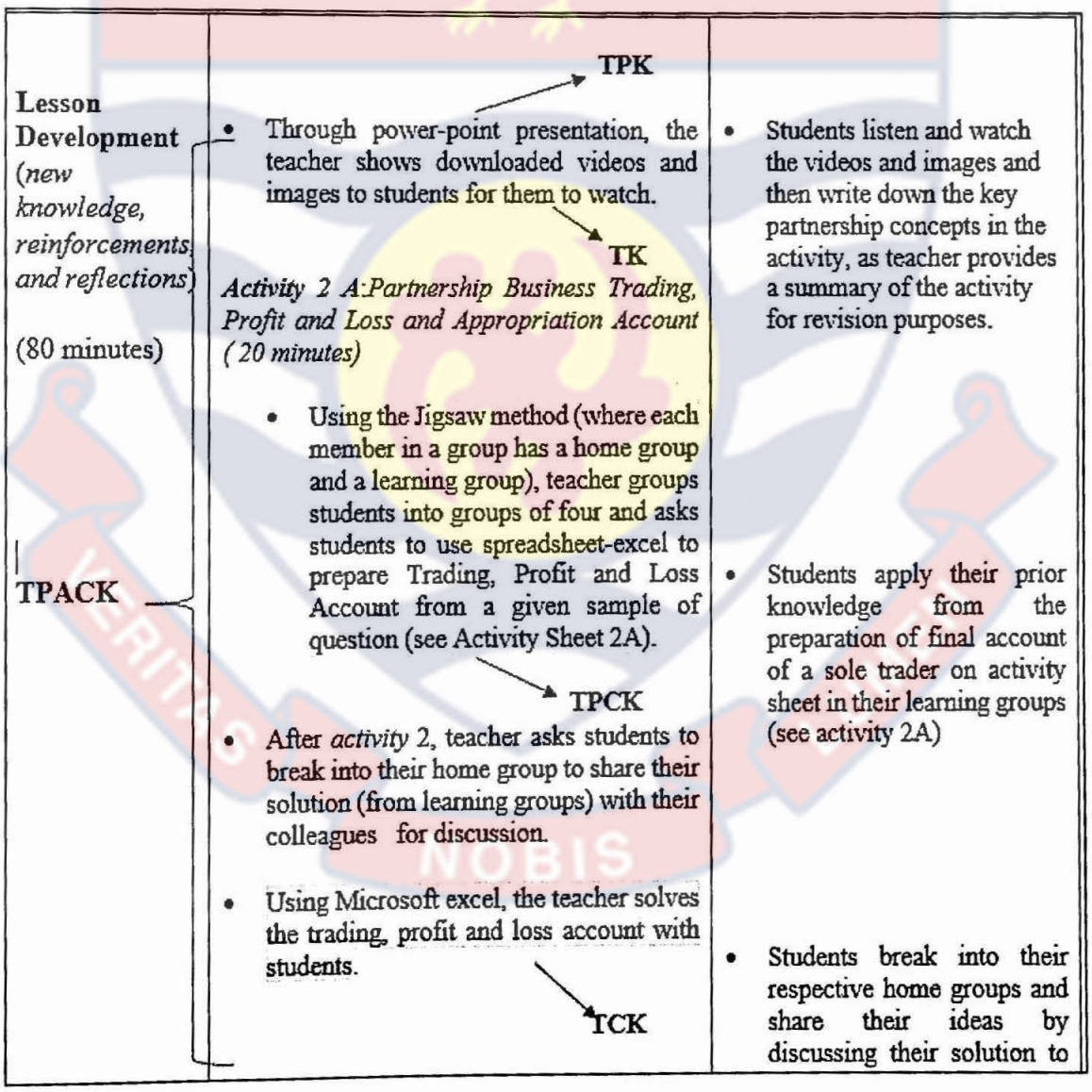


Figure 22: Illustrations of the PSATs' (in Group 4) developed TPACK.

Source: (Field work, 2019).

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Similarly, the PSATs in group 3 (G3TR1 and G3TR2) made use of their developed TPACK in a way that enhanced their teaching strategies as depicted in Figure 23. The evidence from Figure 23 shows that the PSATs in group 3 also used their understanding of the affordances of technology to 1) facilitate the teaching and learning process through interactive and exploratory approach to achieve the learning goal set for Activity 2A: "Using spreadsheet-excel to compute trading, profit and loss accounts" (i.e., employing their TCK); 2) represent the concept of depreciation of non-current assets in a manner that helps learners to define "depreciation of non-current assets in their own words" (i.e., employing their PCK); 3) guide learners to acquire an improved learning outcomes through watching of videos, animations and images in the lesson (i.e. marking use of their TK). Figure 23 below illustrates how the pre-service teachers' in group 3 (G3TR1 and G3TR2) developed TPACK as seen in their lesson plan informed their teaching of accounting in the senior high school.

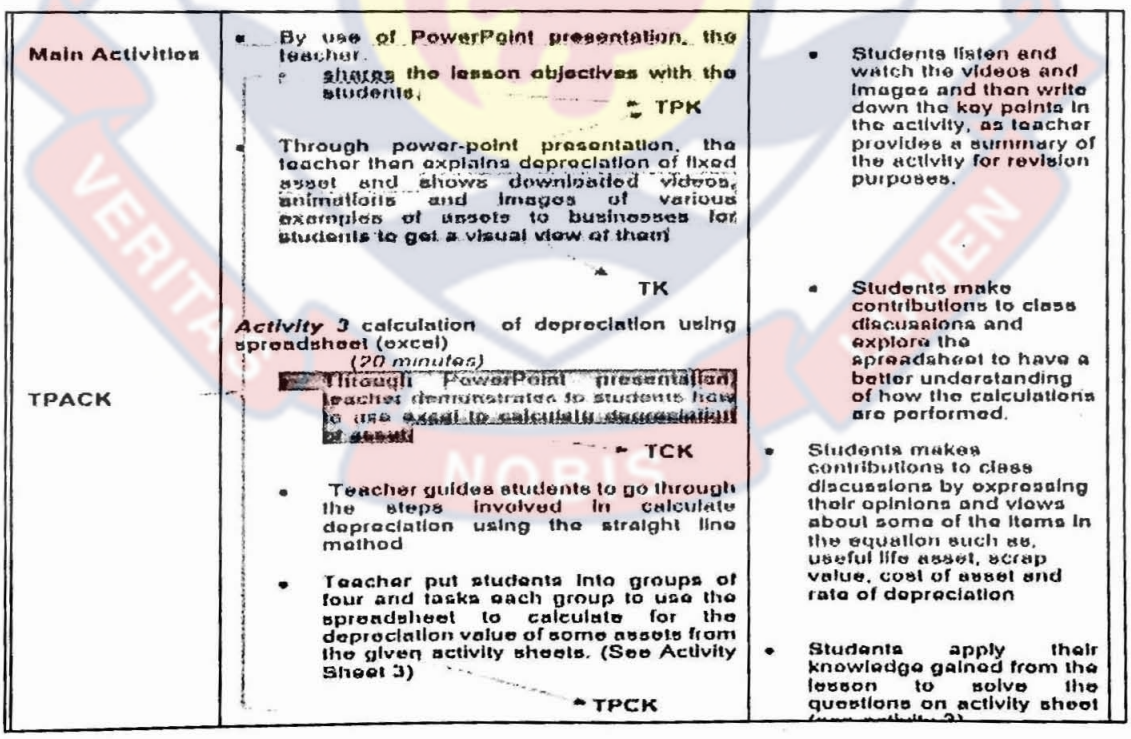


Figure 23: Illustrations of the PSATs (in Group 3) developed TPACK.

Source: (Field work, 2019).

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The PSATs also confirmed during an interview session after the implementation of their ICT supported interventions that their teaching had improved because of their developed TPACK. According to the PSATs, the integration of technology (use of audio-visuals) in teaching accounting in Senior High Schools enhanced their approach of teaching in the sense that most of the concepts in accounting, for example, depreciation of non-current assets which they would have taught in abstraction in a typical traditional classroom was easily taught and projected through the use of videos, animations and images. This approach of teaching accounting helped the PSATs to explain the concepts well for learners to improve understanding of the concepts in the lessons taught.

The following are some of the responses given by the pre-service accounting teachers in response to the question: Was the integration of the audio-visuals helpful in teaching accounting in an interactive manner in this lesson?

G1TR1: *It is very helpful. This is because, over the years, trading, profit and loss account has been taught abstractly. We always memorized the format. I didn't even know that we have excel format for trading, profit and loss account.*

G1TR2: *The use of spreadsheets (excel) in teaching accounting helped the students to pay attention and enhance an easy understanding of the concept taught. In view of this, I think excel should be used often in the teaching of accounting.*

G2TR1: *Yes, it was helpful because of the videos and images used in teaching the concepts. I was able to use animations to demonstrate the stages of value addition in the production*

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distribution chain when I was teaching Value Added Tax which helped the students to retain the explanations I gave during the teaching.

G2TR2: *It was very powerful! Students understood the concept of input VAT and output VAT very well through the use of the pictures in the lesson. I think they will remember what they were taught in class easily and practice it as well.*

G3TR1: *Yes, it helped me to engage the students and sustained their attention throughout the lesson. It also promoted groups discussions where students shared ideas with their peers. In the lesson, most of the things were done by the students themselves and I was just facilitating the process. I have now learnt how to use more students centred strategiesin teaching.*

G3TR2: *Yes, it helped in explaining concepts better and linked them to real-life situations. For example, I was able to use images of mining sites to explain the concept of depletion to students which helped them to obtain an improved understanding of the concept.*

G4TR1: *Audio-visuals materials were very helpful and important in the teaching of partnership account. I was able to show videos of weddings in a church, friends pooling their resources together to start a business all with the aim of introducing the concept of partnership.*

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G4TR2: *It was very interactive as it allowed learners to share opinions with their peers in the lesson.*

The focus group discussion also reiterated that the PSATs developed knowledge and skills in enacting ICT- supported lessons. For example, in one of the focus group discussions, the group mentioned that the professional development training (PDT) helped them to develop competencies and skills (TPACK) needed to design ICT-supported intervention for accounting lessons. This implies that the PSATs teaching practices had improved due to their developed competencies in designing ICT intervention for accounting lessons. The quotations below represent the specific views of some of the pre-service accounting teachers in the focus group discussion. The responses were in respect to the question: How did the initial training workshop (PDT) influence your preparation to teach concepts in accounting with audio-visuals?

G1TR1: *Initially, hyperlinking a text to my PowerPoint presentation was problematic. After the training, hyperlinking a text became easier and also make the preparation of the intervention easier. I was able to hyperlink the income statement format in my presentation*

G1TR2: *Previously, I didn't know how to download videos from YouTube and embedded images and hyperlinks in a presentation. But after the training, I can now do these things easily.*

G2TR1: *It helped me in bringing the world to the classroom by just showing visuals which were appropriate in a simple way.*

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Getting appropriate teaching and learning resources has now become easier and simple to execute.

G2TR2: *It played a huge influence since prior to teaching with audio-visuals, I had a little or no knowledge on the integration of ICT in teaching. However, after the PDT I can now incorporate audio-visuals in teaching concepts in accounting. Through the PDT, I learnt how certain teaching and learning materials (TLMs) which were difficult to bring into class for the demonstration were all projected through the use of ICT. The training has broadened my knowledge about the use of ICT in teaching accounting.*

Through their improved TPACK, the pre-services accounting teachers were able to critique their colleagues designed ICT supported lesson and provided constructive feedback to help their peers to improve their intervention. This was observed during the focus group discussions after each microteaching try-out sessions where the pre-service teachers were given the opportunity to suggest what could be done to improve the intervention. Below are some of the sentiments expressed by some of the pre-service teachers in response to the question: "What can be done to improve the ICT-supported intervention designed and enacted by your colleagues?" The following suggestions were given to group 4 (G4TR1 and G4TR2) after their first teaching try-out with their intervention on the topic: Partnership accounts.

G3TR1: *Sir, the images that they used were appropriate. They had a puzzle,...that is they brought an image of a puzzle,...two people bringing a puzzle together. I think it would have been*

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best if they had brought that one at the introduction before we even read the whole story. Again, I believe the audio-visuals are to aid us in teaching but we should not place all our concern on the audio-visuals. It seems all their attention was on the use of the audio-visuals in the lesson and forgetting about the board and I think blending the two will improve the teaching and learning.

G3TR2: *I will also say that it was ok but they can improve on it. They talked about partnership so I was thinking that to make it more real in class, they could have called out some students to come out in front of the board. They could have demonstrated some form of partnership between the students or something like that. Even though I think they did something on their PowerPoint but I felt that since we were in class they could have used the students themselves to create something, maybe some partnership between them to demonstrate what they were talking about.*

In a similar way, the following feedbacks were given to group 2 (G2TR1 and G2TR2) who taught the lesson on the topic: Value Added Tax (VAT).

G1TR1: *The videos were appropriate just that we couldn't hear the sound well. Apart from that everything was on point. The first image was portraying the fact that students like to shop. They asked students whether they enjoyed shopping, what happens when they shop and they showed a picture of such things and it was just great. The second was a video on how*

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a person will go and cut a tree (lumber), send it to a carpenter for him to produce furniture, he will send it to a retailer and the retailer will give it to a consumer. The video is just on point.

G1TR2: *I think they did very well. The videos and everything but I was thinking that they will bring a real receipt whether picture or physical when they were talking about when people shop and they are given a receipt, and they have written VAT and NHIL, I was thinking probably they will get a receipt. Maybe a sample of a picture or an image of the receipt to show that there is something written on it or anything like that.*

Quantitative data (TPACK self-assessment) collected before and after PDT also corroborated the results of the qualitative data. The purpose of the TPACK self-assessment was to track the PSATs TPACK knowledge before and after the PDT to ascertain the extent of developed knowledge and skills in enacting ICT supported lesson. Table 10 below presents the mean scores for pre and post TPACK self-assessment for the first cohort of pre-service accounting teachers who were involved in phase 1 of the study.

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Table 10: Pre and Post TPACK self- assessment (before and after) PDT for phase 1

Dimension	PRE-PDT		POST- PDT		
	Means	Standard Deviation	Means	Standard Deviation	Gains
TK (Technology Knowledge)	2.71	.47	4.82	.07	2.11
PK (Pedagogical Knowledge)	3.82	.51	4.89	.21	1.07
CK (Content Knowledge)	3.50	.87	4.70	.35	1.20
PCK (Pedagogical Content Knowledge)	3.38	.63	4.50	.29	1.12
TCK (Technological Content Knowledge)	2.40	.85	5.00	.00	2.60
TPK (Technology Pedagogical Knowledge)	3.28	.41	4.91	.12	1.63
TPACK (Technology Pedagogy and Content Knowledge)	2.69	.77	4.88	.14	2.19

Source: Fieldwork, 2019

Generally, the results revealed an improvement in all the TPACK components. This is because the mean scores for the PSATs TPACK self-assessment before the professional development training are lower than the

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Similarly, analysis from Table 11 reiterates an improvement in all the TPACK self-assessment for the second cohort of pre-service teachers. For example, before the PDT, the pre-service teachers indicated that they had less or no knowledge in relation to Technological Content Knowledge (TCK) (M = 2.20, SD = .86) and Pedagogical Content Knowledge (PCK) (M = 2.94, SD = .40) which recorded the lowest mean values. Post-PDT, however, revealed that pre-service teachers seem to have improved in all dimensions relating to TPACK. For instance, Content Knowledge recorded (M = 4.75, SD = .50), an increment of 1.15 points from the Pre-PDT mean with a higher standard deviation. Also, TCK and PCK recorded mean values of 4.70, (SD = .35) and 4.75, (SD = .50) respectively. It is obvious from Table 10 and Table 11 that, both first and second cohorts of PSATs had little knowledge about the use of ICT in teaching accounting (TPACK) prior the professional development training.

However, the results seem to suggest that the PSATs were knowledgeable about their content (CK) and pedagogy (PK) which could be as a result of the fact that, the PSATs were very particular about content and pedagogy because of their micro-teaching practice exercise which was ongoing during the time of the study. The responses given by the pre-service teachers (first cohort and second cohort) suggest that through their developed knowledge and skills in designing and enacting ICT-supported intervention, they gained deeper understanding into the affordances of technology in teaching, identified weaknesses in the ICT intervention for accounting lessons (as observed under focus group discussions) and in addition, became more informed about the

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strategies to adopt in order to guide their learners to understand concepts in accounting better.

Pre-service accounting teachers' improved content knowledge in the subject matter

The second perspective of explaining improvements in teaching with ICT-supported intervention (RQ3) can be understood and explained in the pre-service teachers' improved content knowledge in the subject matter. At the beginning of the initial workshop, it was observed that some of the pre-service teachers had difficulties in explaining certain concepts in accounting. For instance, I observed that some of the pre-service accounting teachers had difficulties with how to explain concepts such value addition in the computation of Value Added Tax (VAT), input Tax and output Tax in the production-distribution chain, depletion of land (depreciation of non-current assets) and profit/loss appropriation account.

However, after the design and implementation of the intervention, they seemed to have gained much understanding into the same concepts and thus, could explain those same concepts better in a way that improved their teaching with the ICT-supported lesson artefacts. Interview data gathered also supported the observation assertions above. For example, some of the pre-service teachers disclosed in an interview that they have personally benefited a lot because their involvement in the study has helped them to gain a better understanding of some concepts in accounting which they had difficulty prior to the study. The following were some of the pre-service teachers' remarks after the implementation of the ICT based intervention.

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The following responses were in respect to the question: What general comment can you make about using audio-visuals supported intervention in teaching accounting in SHS?

G1TR1: *In fact, I have personally benefited a lot from participating in this study because I never knew that there is an excel template that can be used in teaching income statements (trading, profit and loss accounts) prior to this study. I believe from now going I can teach Trading, Profit & Loss accounts very well without any difficulty using the excel template. I can now confidently teach students income statements without necessarily forcing them to memorize the format.*

G2TR1: *I have learnt a lot of new ideas and strategies for using videos, animations and pictures in teaching concepts in accounting. For example, when we were designing our ICT-based lesson on the topic (Value Added Tax), we were able to use YouTube videos and animations to demonstrate the process of Value Addition in the production distribution chain during the lesson.*

Analysis of lesson plan documents (activity sheet and presentation slides) also attests to the fact that the pre-service accounting teachers improved their content knowledge (CK) of the subject matter. This assertion is made on the basis of two main criteria that were used to measure the pre-service accounting teachers' content knowledge (CK) of the subject matter. The first criterion was the quality of the information provided in the lesson plan

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documents and the second criterion was the quality of delivery (i.e. clarity in explanation of concepts). Figure 24 below shows aspects of the information provided in the presentation slides during the implementation of the ICT based lesson designed by group 3 (G3TR1 and G3TR2) for the teaching of the topic: Depreciation of non-current assets.



Figure 24: Aspect of presentation slides provided by group 3.

Source: Fieldwork 2019.

Group 3 (G3TR1 and G3TR2) used the pictures in Figure 24 above to illustrate some properties and equipment of business organizations that can depreciate as a result of continuous usage in the business in generating income. For example, they used pictures such as vehicles, furniture, computers, plants and machines (as depicted in Figure 24) to represent assets that can be used for more than one accounting year in the business (non-current of fixed assets). Through their improved content knowledge, the PSATs were able to use videos in their lessons to demonstrate to students how the Ghana Cedi depreciates against the US dollar for the students to have a better appreciation of the concept

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of depreciation. The video showed in the as depicted in Figured 24 portrayed to the students how the US dollar was rising whilst the Ghana Cedi declined with an arrow showing the reduction in the Ghana Cedi.

The two cohorts of PSATs did not only provide quality information in their lesson plan documents but also provided good explanations of concepts in the subject matter. As a result of their improved content knowledge, the PSATs were able to use appropriate illustrations to support the explanations of the concepts involved in the topic. The clarity in their expression and their ability to handle students' questions all proved that their content knowledge (CK) improved with the use of the ICT-supported pedagogical strategies for accounting lessons.

Figure 25 below shows portions of the activity sheet used by group 1 (G1TR1 and G1TR2) for the teaching of the topic: Bank Reconciliation Statement (BRS). In Figure 25 below, the PSATs used the activity to explain the relationship that exists between the bank statement and the cash book. They explained to the students that items debited in the cash book should always be credited in the bank statement and vice versa. This implies that the bank statement balance should agree with the cash book balance. However, in the activity below, the balances were different and the PSATs asked the students to identify some of the causes of the difference between the cash book balance and the bank statement balance.

For example, it can be observed from the Figure 25 below that a withdrawal of GH₵1500 on 6th August which was debited in the bank statement was not credited in the cash book and this omission will subsequently cause a difference between the cash book and the bank's statement balance. However,

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a deposit of GH₵30,600 on 27th August was credited to the bank statement and debited to the cash book. In this instance, the double-entry principle was complete and this will not cause any difference between the balances. The clarity of explanations by the PSATs all indicated that they obtained improved content knowledge of the subject matter with the ICT intervention.

Activity 2: THE REASONS FOR THE DIFFERENCES BETWEEN THE BANK STATEMENT BALANCE AND CASH BOOK BALANCE

Bank Statement				
Description	Date	Withdrawals	Deposits	Balance
		GHC	GHC	GHC
Balance forward	1 August			25,000
Eft	3 August		20,500	45,500
CHQ 659	5 August	6,050		39,450
CHQ 660	6 August	15,000		24,450
NSF CHEQUE	13 August	6,400		18,050
SERVICE CHARGE	15 August	130		17,920
CHQ 662	24 August	9,680		8,240
EFT OFFICE RENT	26 August	1,300		6,940
DEPOSIT	27 August		30,600	37,540
INTEREST	31 August		55	37,595
CHQ 664	31 August	6,368		31,227
		44,928	51,155	

Cash Book				
Date	Item	Debit	Credit	Balance
		GHC	GHC	GHC
1 August	Balance			25,000
3 August	CHQ 659		6,050	18,950
5 August	CHQ 660		5,000	13,950
10 August	CHQ 661		750	13,200
18 August	CHQ 662		9,680	3,520
20 August	Deposit		230	3,290
27 August	CHQ 664	30,600		33,890
29 August	Deposit		6,368	27,522

Figure 25: Aspect of activity sheet used by group 1 (G1TR1 and G1TR2) for the teaching of BRS.

Source: (Field work, 2019).

Even though there was a positive change in the pre-service teachers' developed TPACK, they encountered some challenges with the use of ICT intervention for accounting lessons. Some of the challenges they faced during the initial stages of the microteaching try-outs were that the PSATs were having difficulty in setting up and teaching with a projector. It was observed that some of the audio-visuals they tried to use in their lessons had a low sound quality and also moved extremely faster than they expected. Again, during the

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microteaching session, some unexpected events happened whilst the PSATs were implementing their designed ICT lesson. For example, some videos and animations that they tried to use for demonstrations in the lessons stop abruptly which created some difficulty for the teachers.

Research Question Four (RQ 4)

How can the improvements in students learning of concepts in accounting using ICT-supported pedagogies be understood and or explained?

To answer RQ4, both qualitative and quantitative data were collected to help in explaining the improvements in students' learning outcomes. The improvements in students' learning of concepts in accounting are explained from two perspectives; enhanced students' learning outcomes and perceived students' experiences with the ICT-based lessons. The two perspectives are explained in details in the next session.

Enhanced students' learning outcomes

In the third and final stage of the study (Test Phase) as mentioned in Chapter 3, the second cohort of pre-service teachers tried their ICT-supported lessons in two senior high schools in Cape Coast. The purpose was to ascertain the utility of the ICT intervention in the real Ghanaian SHS classroom context. Qualitative data gathered during the implementation of the ICT-based lessons suggest that the students who were involved in the study learned their subject matter better as the PSATs taught their accounting lessons. In order to determine whether the ICT-based intervention had any influence on students' learning outcomes, a test consisting of the same items on the topics: Partnership Accounts and Depreciation of Non-current assets was conducted before (pre) and immediately after (post) each of the two lessons (Partnership account and

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Depreciation of non-current assets) designed and implemented by group 3 (G3TR1 and G3TR2) and group 4 (G4TR1 and G4TR2) respectively.

For each of the lessons, the test items were developed by the pre-service teachers and reviewed by the researcher. The tests were made up of four (4) items on Partnership accounts and three (3) items on Depreciation of non-current assets. They were scored out of 10 and an average score of 5 and above was interpreted as a positive and favourable score whilst a score of below 5 was interpreted as a negative and unfavourable outcome. Figure 26 below shows some of the (Pre and Post) test scores obtained by some of the students.

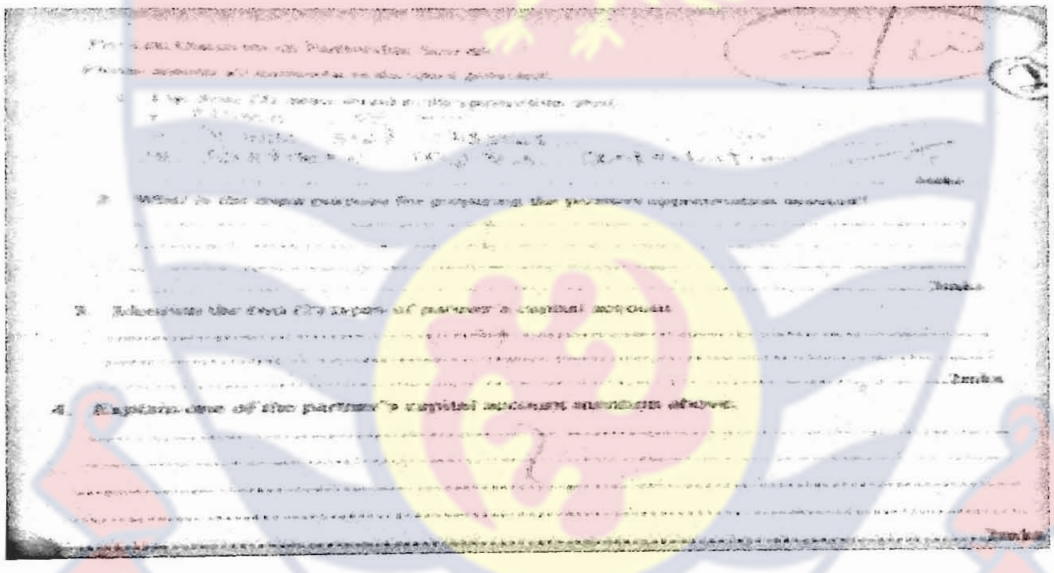


Figure 26A: Student 1 pre-test score

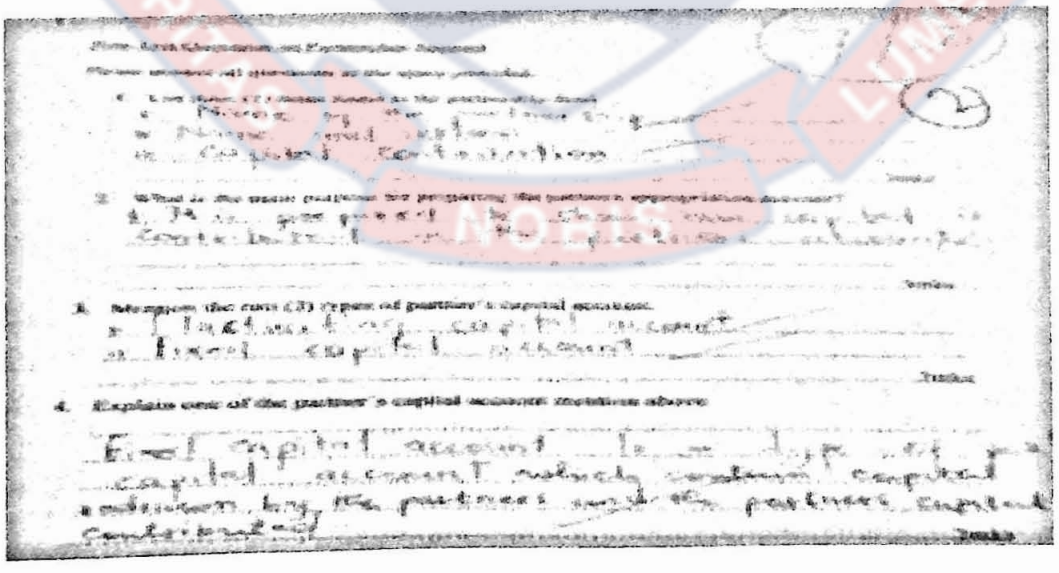


Figure 26B: Student 1 post-test score

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From Figure 26A and 26B above, the student 1 pre-test score increased from 2 out of 10 to 7 out of 10. As observed from the above Figures, the student 1 could not answer three out of the four questions that were asked on partnership during the pre-test. For example, questions such as 1) what is the main purpose for preparing partners appropriation accounts? and 2) mention two types of partners' capital accounts could not be answered by the student in the pre-test. However, in the post-test, after the PSATs through their developed content knowledge had demonstrated to students with the use of videos, animations and spreadsheet (excel) on how the partners' appropriation account is prepared and the reasons why it is prepared, the student 1 was able to answer most of the questions he could not answer in the pre-test. The use of videos and animations in the lesson might have accounted for an increase in the student 1 pre-test score. Figure 27 below also shows the pre-test and post-test scores for student 2.

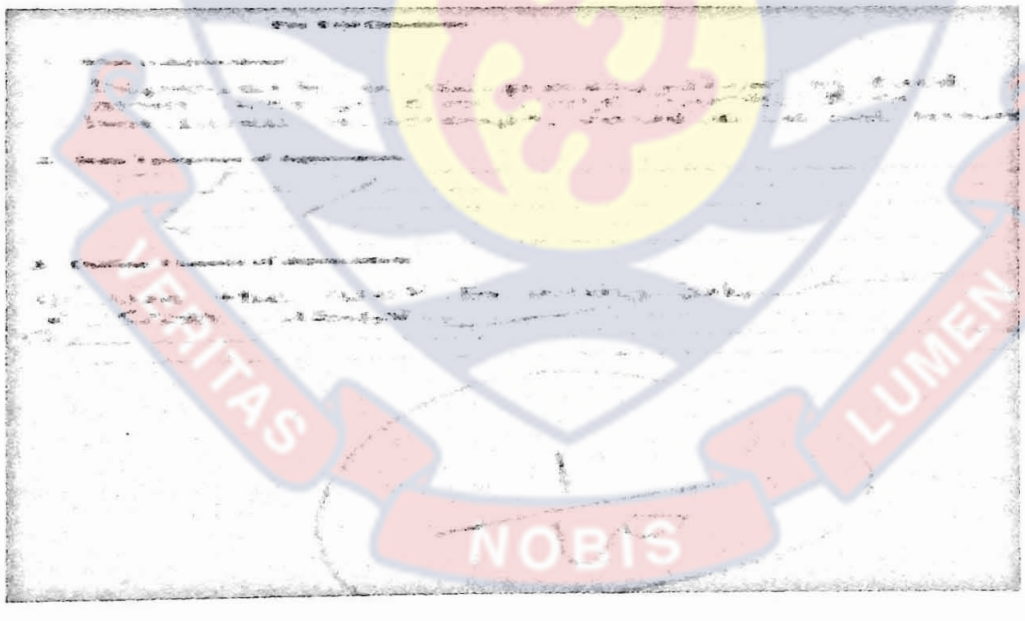


Figure 27A: Student 2 pre-test score

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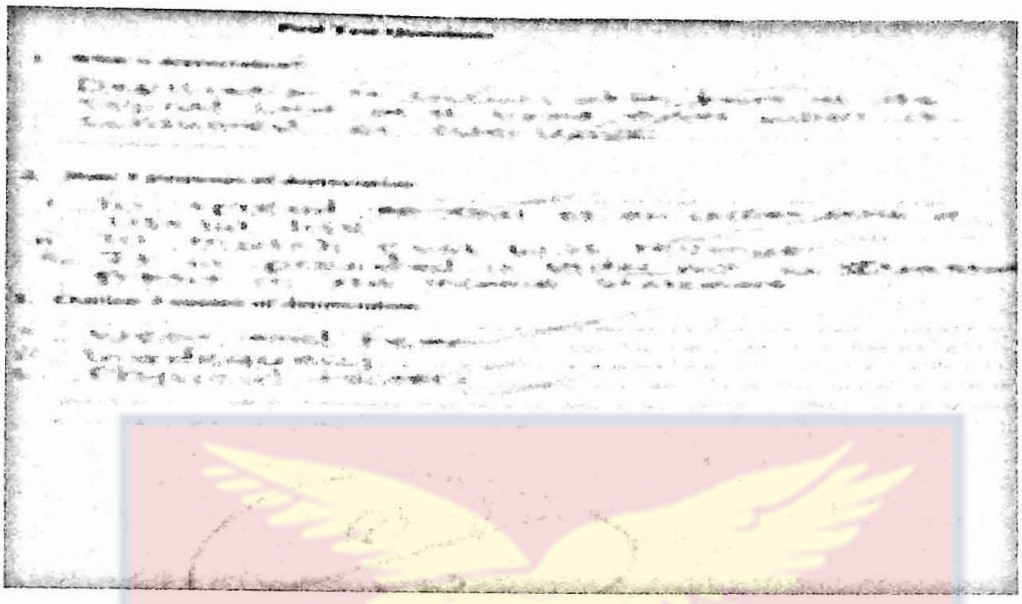


Figure 27B: Student 2 post-test score

Similarly, as observed from Figure 27A and 27B, the pre-test score of student 2 improved from 1 out of 10 to 6 out of 10. The student was not able to answer two out of the three questions that were asked during the pre-test. For example, questions on what is depreciation? and state three purposes of depreciation could not be answered by the student in the pre-test. However, the use of audio-visual materials in explaining the meaning of depreciation in the lesson taught by the PSATs helped the student to improve his performance in the post-test as depicted in Figure 27B.

The improvements in students' learning outcomes were also confirmed by interview data that were collected with some of the students after the implementation of the ICT-supported lessons. Some of the students I interviewed indicated that they obtained improved learning outcomes through the implementation of the ICT-supported lesson. For instance, in relation to the topic: Partnership accounts, the students revealed that they obtained a better understanding of certain concepts such as the appropriation accounts and the partnership deed.

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The following were the responses gathered from some of the students in relation to the question: How will you assess today's lesson?

Student 1: *I think the approach used by the teacher in teaching this topic "Partnership accounts" has helped me to understand the topic better. This is because initially, I was having difficulty in how to calculate for the share of profit, but now with the use of videos, animations and the spreadsheet (excel) in the lesson, I can now compute the share of profit for each partner.*

Student 2: *The lesson was very interesting and enjoyable. This is because the videos and pictures that the teacher used to demonstrate how assets like land deplete especially when he showed us the mining sites (galamsey) videos and pictures to explain the depletion of land.*

Student 3: *The lesson was ok. In fact, I have learnt one new thing which I am so happy about. I never knew that there is an excel template on the computer that can be used to solve trading, profit and loss accounts easily where all the arithmetic computations are performed automatically by the computer.*

The sentiments expressed by students above concerning the ICT-supported lessons indicate that through the interactive nature of the intervention, students learning outcomes during the implementation of the ICT-based intervention improved through the use of videos, images and the animations used during the teaching and learning process.

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Perceived students' experiences with the ICT-based lessons

The improvements in students' learning outcomes were not only measured by the use of their test scores but also by their dispositions towards the ICT-based intervention. Information gathered through observation and interview seems to suggest that the students obtained improvements in their learning outcomes through their perceived positive experiences with the ICT - supported intervention. This assertion is based upon the fact that some of the students who were interviewed immediately after the implementation of the two lessons designed by the PSATs expressed positive experiences with the intervention.

Below are some of the sentiments expressed by the students who were interviewed to share some of their experiences with the ICT-intervention for accounting lessons in SHS.

Student 1: *The activities in the lesson made the teaching and learning process interactive and also the use of videos and images in the lesson generally made the lesson interesting. I understood concepts that I found difficult to understand before with the use of the ICT-intervention.*

Student 2: *The use of the worksheet made the lesson interesting. Also, with the video illustrations of depreciation especially the 'galamesey sites' in the lesson, I can now relate the concept of depreciation to real-life application. Another thing I like about the intervention is the teamwork which helped me to understand better. The use of the PowerPoint presentations also motivated my learning.*

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Student 3: *The use of videos, images and spreadsheet-excel in the lesson has increased my passion to learn financial accounting because with the use of images, YouTube videos, animations and the use of PowerPoint presentations and Spreadsheet – excel in the lesson, I now need little assistance in learning financial accounting. Again, I think that the use of group work in the lesson has enhanced my participation in the class activities and also the teacher used a lot of examples in the delivery of the lesson which made the concept clear for me.*

Student 4: *I found the lesson exciting because there were a lot of activities and group works which made everybody active in the classroom. Most of the things in the lesson were done by us and the teacher was just going round to monitor our performance which helped everybody to be involved. To be frank, this is my first time of using excel to solve accounting question and it was so amazing.*

The students' dispositions towards the ICT-supported pedagogical intervention were also determined quantitatively by the use of students' experiences questionnaire. The experiences questionnaire contained twenty-four items with each item on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The questionnaire was administered in two SHS (School A and School B) immediately after each lesson. Factor analysis was used and three subscales emerged. (see APPENDIX M and N); Delivery: how appealing the lesson was to the students; Comprehension: learners' ability

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to understand the concepts of the subject matter; and Interest: how enjoyable and interactive was the lesson to the students. The results from the three subscales from the analysis indicated that generally, the students from both schools expressed positive dispositions about the ICT innervation. Table 12 below presents the mean values of the three sub-scales for school A.

Table 12: Students' experiences with ICT-intervention for school A (N=31)

S/N	Components	Mean	SD
1	Delivery	4.59	.71
2	Comprehension	4.49	.79
3	Interest	4.81	.38
	Grand Mean	4.63	.63

Source: Fieldwork, 2019.

From Table 12, it can be observed that out of the three factors that seem to explain the experiences of students in relation to the use of ICT in the teaching and learning of accounting, Interest recorded the highest mean value (M = 4.81, SD = .38), Delivery (M = 4.59, SD = .71) while Comprehension (M = 4.49, SD = .79). It is evident that all the three components recorded high means indicating the extent to which the students' experiences with ICT were rated. Similarly, in school B, the students' experiences with the ICT- intervention were measured immediately after the implementation of the PSATs ICT-based lesson. Table 13 below presents the mean values of the three sub-scales for school B.

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Table 13: Students' experiences with ICT-intervention for school B (N=33)

S/N	Components	Mean	SD
1	Delivery	4.34	.85
2	Comprehension	4.17	.95
3	Interest	4.34	.74
	Grand Mean	4.28	.85

Source: Fieldwork, 2019

Results from Table 13 also indicate that out of the three factors that seem to explain the experiences of students in School B in relation to the use of the ICT-intervention in teaching and learning of the subject matter, Delivery and Interest recorded the same mean values with differences in the standard deviation; Delivery (M = 4.34, SD = .85), Interest (M = 4.34, SD = .74) respectively while Comprehension (M = 4.17, SD = .95). However, comparing the experiences of the two schools, it can be observed that, the overall mean for School A (M = 4.63, SD = .63) exceeds that of School B (M = 4.28, SD = .85) by .35. This implies that the experience of students in relation to the use of ICT-intervention in teaching and learning of accounting in school A was enormous as compared to students in School B. This could have attributed to the differences in the ICT resources available in the schools. For example, School B had an ICT laboratory completely furnished while School A did not have a completely furnished ICT laboratory. Hence, while it was the first time of students in School A to be exposed to these ICT tools in the class, their counterparts in School B had been exposed to most of those ICT tools.

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Discussion of Key Findings

The key findings of the study as emerged are discussed based on the four research questions that guided the study. Thus, this section discusses the key findings in accordance with the research questions as well as the literature review in Chapter 2 of this study.

RQ1: What are the features of ICT-intervention that can be designed to fit the realities in the SHS classroom in Ghana in a manner that makes the teaching of accounting interactive?

The purpose of RQ1 was to determine the features of ICT-intervention that can fit the realities in the Ghanaian SHS classroom context. Guided by the initial design guidelines which were formulated based on the literature reviewed (Agyei & Voogt, 2012; Rao & Jyoti, 2012; Mishra & Koehler, 2006; Naidoo, 2003; Rather, 2004; Mingfong, et al., 2010; Harris & Hofer, 2009; Wilson, 2010; Sjoberg, 2007; Kishore, 2003; Rautrao, 2012;), two exemplary ICT-supported materials were designed with the following features. The interventions: 1) were interactive using audio-visual materials (IAVMs); 2) leaned themselves to collaborative learning approach (CLA); 3) were activity-oriented; 4) required the teacher to have knowledge of technology to design and enact ICT lessons; and 5) were adaptable in classrooms where there was internet connectivity or no internet connectivity (see APPENDIX A1 and A2).

With reference to these features, the exemplary ICT materials appear to position the teaching of SHS accounting with ICT (audio-visuals) in constructivist teaching and learning environment by providing vivid experiences and interactivity through lesson activities in order to enhance

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students' learning of concepts in accounting. The specific features of the exemplary materials are discussed in the following paragraphs:

Affordances of audio-visual materials

The affordances of the interactive audio-visual materials (IAVMs) in the teaching and learning of accounting provide the opportunity for students to interact and obtain better insight into the concepts in accounting. According to Rao and Jyoti (2012), it is the responsibility of teachers to make learning enjoyable as possible for learners. Therefore, in order to avoid any breaking of communication between the teacher and the student, it is most preferable to use audio-visual aids (Rao & Jyoti, 2012). Audio-visual aids are those instructional devices (videos, images, projectors, radio, television etc) which are used in the classroom to encourage learning and make it easier and interesting (Rather, 2004).

Audio-visual materials in teaching stimulate thinking and understanding (Kishore, 2003). This implies that the IAVMs feature in the exemplary ICT-supported materials designed for accounting lessons have the potential to make the teaching of accounting at senior high school level easier and interesting by stimulating students' thinking and understanding of concepts in the topic. Using audio-visual materials in teaching accounting in SHS is one way of enhancing lesson plans and provide students with additional platforms to process subject information (Kunari, 2006).

According to Lestage (2009), the use of pictures, animations, and sounds (as depicted in Figure 5 and Figure 19) can help teachers keep students' interest in the teaching and learning process. It is important to mention that the potentials of audio-visual materials in enhancing the teaching and learning of

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accounting cannot be overemphasized in the sense that they enable teachers to project certain concepts in accounting lessons. For example, the use of videos, animations and pictures in the first exemplary material (see APPENDIX A1) to demonstrate classes of assets in teaching accounting equation has the potential of enhancing students' learning outcomes in a lesson. In the traditional accounting classroom, it appears most of the concepts in accounting are taught in abstraction which sometimes does not help students' retention of concepts in a lesson. Some students tend to forget easily what they are taught immediately after the lesson.

This assertion is evidenced from a Chinse proverb that says: "If I hear, I forget, if I see I remember, and if I do something, I understand it" (Jain, 2004). As it can be observed from the second exemplary material (see APPENDIX A2), the inclusion of the interactive audio-visual (excel format for income statement) will provide a platform for students to explore and manipulate figures (expenses) on the computer to see their effect on the profit. The interactive audio-visual feature in the two designed exemplary materials has the potentials to enhance the teaching and learning process by making it more effective. This, however, could enhance students learning outcomes of concepts in accounting. A study conducted by Rautrao (2012) suggests that approximately 83% of human learning occurs visually, and the remaining 17% through the other senses - 11% through hearing, 3.5% through smell, 1% through taste, and 1.5% through touch. The results of this study perhaps underscore the importance of audio-visual materials in the teaching and learning of accounting in SHS. These thoughts about audio-visuals as situated in

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literature were found to be instrumental to the design and development of the exemplary intervention.

Effectiveness of a collaborative approach environment

Collaborative learning approach (CLA) feature in the ICT-supported intervention as illustrated in the study was informed by Teasley and Roschelle's (1993) definition of collaborative learning that it is a learning environment in which students make contributions to solve problems together. The results of the study revealed that most of the activities in the two exemplary materials were done in groups by the students. For instance, the use of pedagogical strategies such as think-pair-share, jigsaw and group presentation in the lesson plans (see APPENDIX A1 and A2) all aimed at promoting interactions among students in the classroom.

According to Rogoff (1990), in a collaborative classroom, students begin to view one another as resources rather than competitors. This allows students to share ideas and experiences together, which helps students to improve on their learning outcomes by learning from their peers. Strommen and Lincoln's (1992) findings are in line with the view of Rogoff (1990) that, in the collaborative classroom, students see the peers as a resource but not competitors. This implies that students in high collaborative classrooms will have no difficulty to share information with their peers in the class. Lunenberg (1998) believes the value of collaborative learning is in the opportunity for learners to elaborate on their own ideas as well as those of their peers.

Teamwork among students in collaborative learning environment enables students to help each other in the learning process as the age-old adage of "Iron sharpening iron" (Janssen et al., 2010) is indeed true for learners in a

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variety of guided situations. The inclusion of the CLA feature in the ICT-supported pedagogical strategies intervention was necessary for ensuring that instructional and learning processes take place in an atmosphere that is highly driven by interactions, reflections, and learners' personal experiences with the aid of the ICT tool and not in a teacher-centred setting. Hence, the CLA feature of the exemplary material appears to bring to bear the concept of interactivity in the accounting classroom.

The role of activities in lesson design

Another feature of the ICT intervention is the inclusion of activities in the lesson as the results indicated in the study. The results revealed that the two exemplary ICT supported materials incorporated activity sheet in the lesson. The use of the activity sheet in the lesson provides the opportunity for learners to be engaged in the lesson. Agyei (2012) asserted that "Students must be active during learning" in order to effectively project the constructivists' ideas of learning. Active learning is generally defined as any instructional method that engages students in the learning process (PDST, 2017). It requires students to do meaningful learning activities and think about what they are doing as individuals.

Therefore, the activity sheet which is an integral part of the intervention reflects various ways in which interactivity, as defined by use of the Active, Collaborative, Authentic and Intentional (Wilson, 2010; Sjoberg, 2007), could be realised in order to promote the learner to take full responsibility of the learning process as well as stimulating and sustaining their interest throughout the instructional process. Both exemplary materials included activities in the

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lessons to serve as the platform to engage all the learners actively in the lesson to enhance their understanding of the concepts in the lesson.

The essence of technology knowledge

Finally, informed by Mishra and Koehler's (2006) TPACK framework, the ICT-supported intervention lesson was designed in such a manner that reasonable knowledge about the use of technology in teaching is required for its successful implementation. For example, the first exemplary material incorporated the use of videos, animations PowerPoint presentations and images (see Figure 5) to illustrate the types of non-current assets during the teaching of the accounting equation. The second exemplary material also used a spreadsheet (excel), YouTube videos and animations to demonstrate how to compute the net profit or loss using the excel format for income statement (see Figure 7).

The result of the study shows that the researcher included audio-visual materials in the exemplary materials. Therefore, it was imperative for the pre-service teachers to develop their knowledge and skills in ICT. The two ICT exemplary materials were designed to be adaptable in both classrooms' learning environment where there is internet connectivity or where there is no internet connectivity. TPACK is one form of highly practical knowledge that combines teachers' concurrent and interdependent curriculum content, general pedagogy and technological understanding (Harris & Hofer, 2009). According to Mishra and Koehler (2013), the rapid rate of technology change requires the teacher to have a deep understanding not just of the technology but also of the content to be covered, the pedagogical approaches to be supported and the contexts within which teaching/learning is to happen. Thus, the technologically oriented knowledge feature of the ICT-supported intervention for accounting lessons is

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to demonstrate how interactive teaching with ICT is realised and driven by teachers' specific ICT-oriented knowledge (TPACK) for the creation of a constructivist classroom for meaningful learning outcomes.

In conclusion, informed by literature, the four (4) features of the exemplary ICT material as discussed above seemed to project interactive teaching of accounting. The features of the ICT-supported intervention apparently situate the exemplary lesson as one of the central means by which pre-service accounting teachers could be motivated to gain a deeper understanding of ICT-based innovations. This could equip the teachers to develop competencies for integrating ICT into their teaching practices in an interactive manner. However, it is important to note that, even though these features (as mentioned above) could be effective in promoting interactive teaching of SHS accounting in the Ghanaian classroom context, this may not necessarily be the case in other countries as a result of different context. However, it is encouraging to mention that the intervention could be adapted to incorporate features that meet the specific needs of other contexts.

RQ2: How effective is the ICT intervention in developing pre-service accounting teachers' pedagogical strategies to improve teaching and learning of concepts in accounting?

For the purpose of this study, effectiveness referred to the extent to which the four (4) dimensions for interactive teaching Active, Collaborative, Authentic and Intentional (Wilson, 2010) were projected in the design and implementation of the ICT supported intervention for accounting lessons. Both qualitative and quantitative data were collected in order to determine the effectiveness of the ICT-intervention in developing PSATs' pedagogical

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strategies to improve the teaching and learning of concepts in accounting. Generally, findings emerged from the results of the study revealed that the ICT-supported lesson designed and implemented in the study was effective in developing the PSATs' pedagogical strategies to improve the teaching and learning of accounting. This is because the ICT-supported lesson promoted interactive teaching and learning in a constructivist manner which in turns enhanced students' learning outcomes. Both qualitative and quantitative results from the perspective of the pre-service accounting teachers showed that all the four ICT-supported lessons for accounting lessons were effective (projected Active, Collaborative, Authentic and Intentional).

The qualitative results (e.g., Figures 15, 16, 17 and Table 9) showed that the PSATs used the ICT-supported lesson to 1) engage their learners in learning the subject matter (Active); 2) engage learners to work in groups for ascertaining divergent knowledge expressions in order to promote teamwork abilities of the learners (Collaborative); 3) relate learning of accounting concept in the classroom to students' personal experiences and real-world context (Authentic) and 4) measure students' performances on activities through monitoring, evaluation and providing feedback to students for them to improve their learning outcomes (Intentional). Similarly, the quantitative results confirmed that the ICT-supported lesson promoted interactivity (Active, Collaborative, Authentic and Intentional) in teaching SHS accounting (see Table 9). It is clear from Table 9 that, the overall mean values recorded for the four dimensions for interactive teaching were; Active = 4.54; Collaborative = 4.44; Authentic = 4.26 and Intentional = 4.36 .

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This implies that the ICT-supported intervention designed and implemented in the study was effective in developing PSATs' pedagogical strategies to improve the teaching of accounting in SHS in Ghana. For example, findings from both PSATs and students who were involved in the study revealed that the ICT-supported lessons designed by the pre-service teachers' projected interactive teaching of accounting and also enhanced students' learning outcomes. These findings from the current study are consistent with the findings of a study conducted by Allan (2007) that the integration of instructional technology in teaching has the potential of making the lesson more interactive and sustains students' interest. According to Kelley and Serb (1961), "The use of audio-visual aids in the classroom will free the teacher from work". This assertion was evidenced in the study because the ICT-supported intervention designed and implemented in the study equipped the PSATs to use more student-centred constructivist pedagogies in teaching concepts in accounting. Constructivist pedagogies acknowledge instructional strategies where students learn by personally and socially constructing their own knowledge (Biggs, 2003).

According to Tetzlaff (2009), constructivism is characterised by active engagement, constructive, intentional, complex, contextual, collaborative, conversational, and reflective. Constructivism believed that students' learning is an active process where students make meaning of sensory inputs (Hein, 1991) and knowledge is something that students built on through partial, incorrect, or apparently unnecessary existing knowledge unless carefully guided (Taber, 2011). Furthermore, Brush and Saye's (2000) found out that when ICT is used with a constructivist teaching approach, positive learning outcomes are

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ensured. The potentials of ICT, among others, enable students to be authentic in achieving their personal goals, develop critical thinking skills and actively interact with teaching and learning materials (Allan, 2007; Fu, 2013; Koh, 2013). The results revealed that the use of ICT (audio-visuals) intervention in teaching concepts in accounting in SHS encouraged students to be active in the teaching and learning process (see Figure 15) which implies students did most of the activities on their own which helped them to think critically in constructing their own knowledge. This finding aligns with the view of Dorit, (1999) that active learning must happen in order for knowledge to be owned by the learner. Similarly, according to Jonassen and Reeves (1996), learners must be given opportunities to be active in ways that will promote self-direction, creativity and critical analysis of problems requiring a solution.

Even though the results of the study appear to suggest that a blend of all the four dimensions (Active, Collaborative, Authentic and Intentional) played a key role in attaining interactivity with the ICT intervention for accounting lessons, their unique contributions as perceived by both the PSATs and students seem to differ from one dimension to the other. This was particularly so because the results revealed that among the four dimensions, Collaborative feature seems to have been mostly projected (see Figure 8 and Figure 12). This might be due to the fact that the pre-service teachers might have linked their understanding of interactivity more to Collaborative teaching than the other three dimensions. This seems to suggest that the Collaborative dimension goes beyond providing platforms for divergent knowledge expressions as suggested by Koh (2013) to inherently sustain the other three dimensions in order to

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facilitate the creation of an interactive teaching and learner-centred environment.

Wolmarans, (2000) also reveals that empirical research indicates collaborative learning promotes higher achievement than competitive and individualistic learning does. Based on the findings discussed above, the study concludes that the ICT-supported intervention that was designed and implemented in the study was effective in developing PSATs' pedagogical strategies to improve the teaching of concepts in accounting.

RQ3: How Can the Improvements in Teaching Using ICT-Supported Pedagogical Strategies be Understood and or Explained?

Two perspectives were used in explaining the improvements in teaching using ICT-supported pedagogical strategies in teaching accounting. The improvements in teaching were explained from the perspective of; 1) pre-service teachers' developed knowledge and skills in enacting ICT supported lessons and 2) pre-service teachers' improved content knowledge in the subject matter. Generally, results from both qualitative and quantitative data revealed that the improvements in the pre-service teachers' knowledge and skills are reflected through their developed TPACK (for example as depicted in Table 10 and Table 11) of the study.

There were two cohorts of PSATs for phase 1 and phase 2 who were taken through a professional development training arrangements to enable them to improve on their knowledge and skills in using ICT (audio-visuals) in teaching concepts in accounting. The results obtained from the analysis of their lesson plan documents, interviews and focus group discussion data indicated that the PSATs developed their TPACK during the professional development

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training. This is because prior to the professional development training, the PSATs' TPACK was measured and the results revealed that most of them had weak knowledge about the use of technology in teaching. For instance, majority of the PSATs did not know how to; download videos from YouTube, prepared PowerPoint presentations, hyperlink a video or a document in a presentation and finally how to use spreadsheet excel (see APPENDIX B)

However, the lesson plan documents designed by the PSATs and implemented in the study, for example, showed that the teachers did not only developed their TPACK as a unique body of knowledge but also sought to bring to light the simple combination of the three knowledge bases during their teaching with the ICT-supported lesson (see Figure 22 and Figure 23). This finding clearly shows that views about the nature of the TPACK model (Mishra & Koehler, 2006) are fundamental for providing the basis for understanding how teaching improved based on the pre-service teachers' developed TPACK in the context of the study. This apparently led to a positive change in the prospective teachers' ways of teaching accounting.

The results from the study (see Table 10 and Table 11) further proved that there were improvements in the PSATs' knowledge and skills for using ICT pedagogical strategies in teaching the subject matter. The overall results for both Phases (See Appendix B) show an improvement in all the components of TPACK with largest areas of change occurring in technology-related sub-scales: TPACK (gain=1.87), TPK (gain = 1.50), TCK (gain = 2.35), and TK (gain = 1.75). This is an indication that the pre-service teachers developed their technology integration knowledge and skills in the technology-related sub-scales much better as they might have perceived them as new knowledge.

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The results from the interview data also confirmed that their knowledge and skills in designing and enacting ICT supported lessons improved during the professional development training (PDT). This seems to align with studies that showed that teachers' professional development programmes played a significant role in the effective integration of ICT in education (Ho, Watkins & Kelly, 2001; Hew & Brush, 2007).

Professional development and its components played a significant role in the study. One of the reasons for the teachers' developed TPACK was the nature of the professional development training (PDT). The professional development arrangement for this study was in three (3) stages: 1) an introductory workshop for the teachers 2) design of ICT-supported lessons by the pre-service teachers in teams and 3) implementation of the lessons designed by the PSATs (see Table 2). During the implementation, there was an iteration of teaching try-outs by the pre-service teachers in a microteaching as well as in peer teaching sessions.

According to Hew and Brush (2007), teacher training programmes have an impact on teachers' attitudes and conceptions of ICT which helps teachers to acquire necessary knowledge and skills to integrate ICT in teaching and learning situation. Another study conducted by Carlson and Gadio (2005) revealed that traditional one-time teacher training (workshop, short training) programmes are not effective in assisting teachers to build technical competency for using ICT in their teaching-learning situation.

Notwithstanding the positive change in the pre-service teachers' developed TPACK, they encountered some challenges with the use of ICT intervention for accounting lessons. Some of the challenges they faced during

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the initial stages of the microteaching try-outs were that the PSATs were having difficulty in setting up and teaching with a projector. It was observed that some of the audio-visuals they tried to use in their lessons had a low sound quality and also moved extremely faster than they expected. Again, during the microteaching session, some unexpected events happened whilst the PSATs were implementing their designed ICT lesson. For example, some videos and animations that they tried to use for demonstrations in the lessons stop abruptly which created some difficulty for the teachers. This seems to confirm Hutchison and Reinking's (2011) observation that when teachers lack the required ICT-oriented knowledge, they seem to have difficulties in building on their existing pedagogical content knowledge.

Another challenge observed in the process of development of the pre-service teachers' TPACK was the difficulty in teaching subject matter from the learner-centred perspective. The results from the interview conducted during the PDT revealed that the PSATs were deeply rooted in the teacher-dominated strategies for teaching the subject matter. They perceived pedagogy to mean a teaching approach that is purely teacher-centred irrespective of the instructional tool used. This finding seems to align with Agyei's (2012) observation that the teacher-centred approach is the main teaching approach being adopted to train the prospective teachers in Ghana.

According to Westbrook (2013), since recent curriculum reforms have moved away from 'teacher-centred' pedagogic approaches to more student-centred approaches, it is, therefore, imperative for teachers to use constructivist pedagogical strategies with ICT to enhance teaching and learning. It is, however, important to mention that with the series of teaching try-outs, the

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PSATs were able to improve on these challenges mentioned above and successfully incorporated ICT in their lessons.

RQ4: How can the improvements in students learning of concepts in accounting using ICT-supported pedagogies be understood and or explained?

The discussions with regard to RQ4 are presented from two perspectives as reported in the results section as; enhanced students' learning outcomes and perceived students' experiences with the ICT-based lessons. Enhanced students' learning of concepts in accounting with ICT-supported intervention can be explained based on the improvements that occurred in students' learning outcomes as depicted in Figure 26 and Figure 27. Analysis of the results (Figure 26 and Figure 27) of both the pre-test and post-test scores of the students indicates that the ICT-supported intervention enhanced students' learning of concepts in the subject matter. This improvement in students' learning outcomes seems to have resulted from the use of audio-visual materials in the teaching of the topics such as: Depreciation of Non-Current Assets and Partnership Accounts.

The students in an interview confirmed that the use of the audio-visual materials (videos, animations, and images) in the lessons helped them to gain improved insights into the subject matter. During the implementation of the ICT-supported lessons, it was observed that the PSATs were able to use pictures, animations and PowerPoint presentations to represent concepts in accounting such as the depletion of non-current assets and the partnership deed which would have been taught in abstraction in a traditional accounting classroom context.

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The findings above seem to imply that the ICT (audio-visual) intervention stimulated students' understanding of concepts in accounting as well as their conceptual development of the subject matter which shows an indication of the extent to which the ICT (audio-visuals) intervention facilitated understanding of the concepts taught. This explanation is consistent with the view of Jain (2004) that, audio-visual aids provide the learners with realistic experience, which capture their attention and help in the understanding of the concepts in a lesson. A study conducted by Jain (2004) revealed that, audio-visuals in teaching appeal to the mind through the visual-auditory senses which aid in the retention of lesson thought. In a similar study, Kishore (2003) opined that "audio-visual aids stimulate thinking and understanding". Specifically, findings in these studies situate ICT as a useful tool for the enhancement of students' conceptual understanding of concepts in a lesson.

Another perspective from which the enhanced students' learning of concepts in accounting with ICT (audio-visuals) intervention could be explained is from the point of view of students' perceived positive experiences with the ICT-supported intervention. The results from the factor analysis (see Table 12 and Table 13) showed that the students seem to express positive depositions after their encounter with the ICT-supported intervention for accounting lessons. For example, the students indicated that the ICT-based lessons were generally interesting and enjoyable with a lot of activities which helped them to be more active in the lesson. They also pointed out that the use of videos, animations and images in explaining concepts in accounting helped the PSATs to make the content of the lesson clear which facilitated their understanding of subject matter. This was evidenced from quantitative data (see

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Table 12 and Table 13) where students from both school A and school B after the implementation of the ICT-based lessons indicated that the use of images, YouTube videos, animations and the use of PowerPoint presentations and Spreadsheet – excel in accounting lessons enabled them to learn on their own as they would require little assistance.

The results show that all the three components (Delivery, Comprehension and Interest) for both schools recorded high means indicating the extent to which the students' experiences with ICT were rated. Interest recorded the highest mean value (M = 4.81, SD = .38), Delivery (M = 4.59, SD = .71) and Comprehension (M = 4.49, SD = .79) for school A while for School B, Delivery (M = 4.34, SD = .85), Interest (M = 4.34, SD = .74) and Comprehension (M = 4.17, SD = .95). These ratings by the students seem to be consistent with the findings from a study by Saima, Qadir, and Shazia (2011), where they stated that the use of audio-visuals in a lesson makes teaching and learning process effective by providing knowledge in depth and detail. Lestage (2009) was also of the view that the use of pictures, animations, and sounds can help teachers keep students' interest in teaching and learning process which in turn sustains their attention in the classroom. Similarity, Rautrao (2012) conducted a study and found out that approximately 83% of human learning occurs visually, and the remaining 17% through the other senses - 11% through hearing, 3.5% through smell, 1% through taste, and 1.5% through touch.

Summary of the Chapter

In this chapter, qualitative and quantitative evidence were used in addressing the four (4) research questions that were formulated for the purpose of developing pre-service accounting teachers' pedagogical strategies for

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integrating ICT (audio-visuals) in teaching SHS accounting in an interactive manner. The results have shown that the exemplary ICT materials designed for the study promoted interactive teaching with its inherent features and thus, signify the kind of ICT intervention that fits the realities in the senior high school accounting classroom in Ghana. The study has also revealed that the pre-service teachers gained knowledge and skills in developing their own ICT-supported lessons and that the ICT-supported intervention developed in the study was found to be effective in developing pre-service teachers' pedagogical strategies to improve teaching and learning of concepts in accounting.

Furthermore, the results have shown that the improvements in teaching using ICT supported pedagogical strategies can be explained and or from the pre-service teachers' developed knowledge and skills in enacting ICT based lesson. Finally, the study revealed that the improvements in students' learning of concepts in accounting can be explained and or understood from their enhanced learning outcomes and their perceived positive experiences with ICT (audio-visuals) lessons.

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CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the summary of key findings of the study to provide conclusions based on which recommendations for practice, policy and further research are made. In addition, the chapter presents a reflective account of the Design-Based Research approach used in conducting the study to substantiate the final design guidelines.

Summary of the Research Process

The overall aim of the study was to develop pre-service accounting teachers' pedagogical strategies for integrating ICT (audio-visuals) in an interactive manner in teaching and learning of senior high school accounting in Ghana. This was driven by the need to design an effective and appropriate intervention for integrating ICT in the teaching and learning of senior high school accounting in order to improve teaching and enhance students' learning. In order to address the objective of the study, four research questions were formulated: *RQ1, What ICT interventions can be designed to fit the realities in the SHS classroom in Ghana in a manner that makes the teaching of accounting interactive?; RQ2, How effective is the ICT intervention in developing pre-service accounting teachers' pedagogical strategies to improve teaching and learning of concepts in accounting? RQ3, How can the improvements in teaching using ICT-supported pedagogical strategies be understood and or explained? and RQ4, How can the improvements in students' learning of concepts in accounting using ICT-supported pedagogies be understood and or explained?*

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The overarching theory in the conceptual framework was the constructivist theory. The constructivist theory was used as a guide in developing pre-service accounting teachers' competencies in developing ICT supported lessons that enhance the teaching and learning of accounting in an interactive manner in SHS classrooms in Ghana. Constructivism was achieved in the study through the use of active, collaboration, authentic and intentional strategies in the teaching and learning process. The TPACK framework, which was also used in the study was employed to unpack the kind of ICT-oriented knowledge that teachers need to drive interactive prospects with ICT (use of audio-visuals in teaching). The TPACK framework also served as the underlying theory for the preparation of pre-service teachers to effectively design and implement ICT (audio-visual) lessons. Thus, the TPACK framework served as a benchmark for measuring the pre-service teachers' ICT-oriented knowledge and skills.

Technology was operationalised as the use of audio-visuals (representing the "T" component of the TPACK model) in achieving interactive teaching prospects that were activity driven (that is the "P" component of the TPACK model) to enhance the teaching and learning of SHS accounting (representing the "C" component of the model). The adoption of the TPACK framework was effective in measuring the PSATs knowledge and skills required for successful integration of instructional technology to promote interactive teaching. In this regard, the framework guided the pre-service teachers to obtain an understanding of the interplay between technology (TK), Pedagogy (PK) and Content (CK). This enabled them to shift from the traditional pedagogical approaches to a more learner-centred pedagogies that are situated in the context

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of constructivism. The TPACK framework that was operationalised in the study is shown in Figure 28 below.

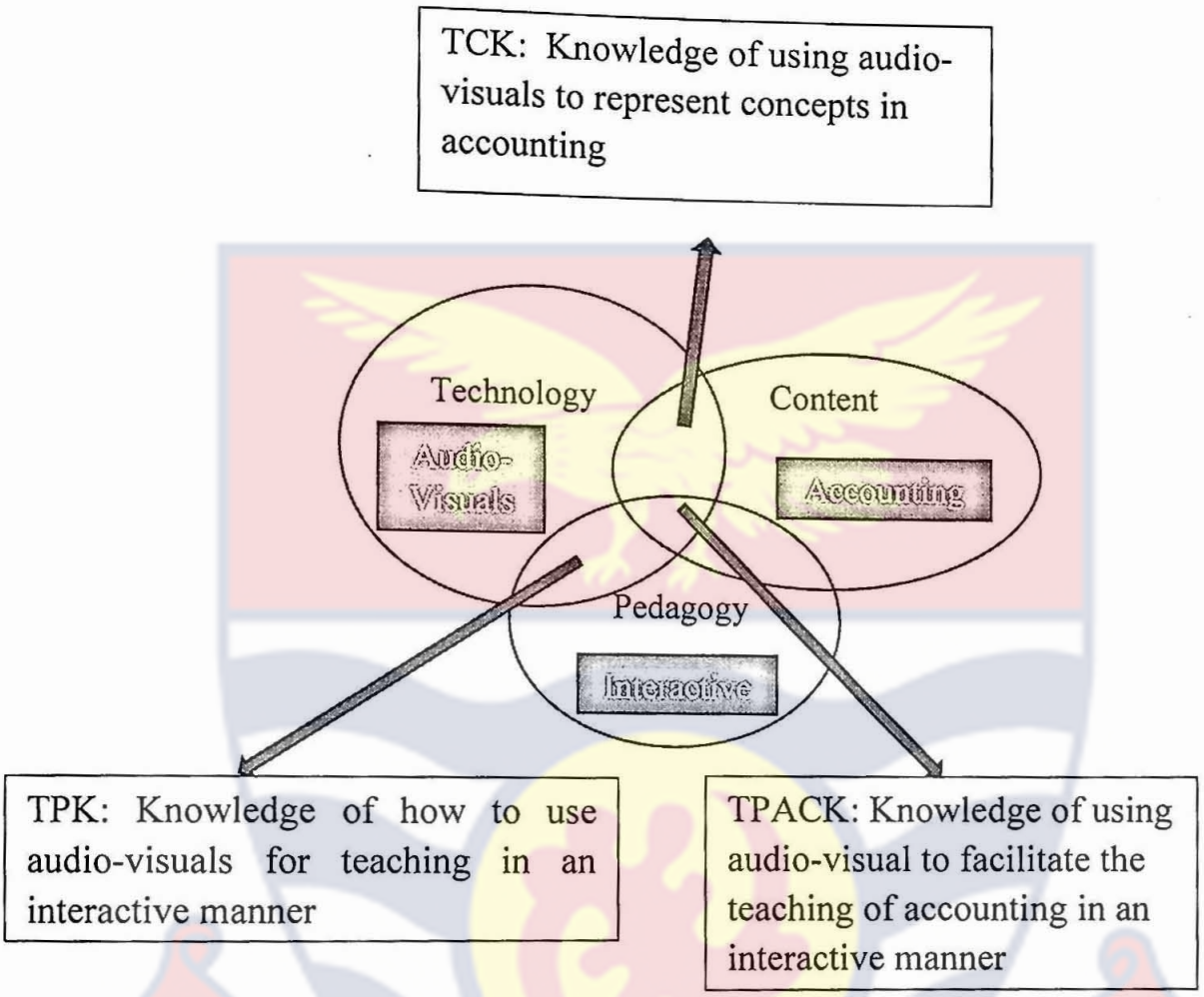


Figure 28: Operationalised TPACK for the study.

Source: (Field work, 2019).

DBR approach adopted in this study employed an explanatory case study design using qualitative as well as quantitative evidence. Thus, data for the study were collected using semi-structured interviews, observations, focus group discussions, pre- and post-tests, questionnaires and analysis of lesson artefacts designed. Multiple data sources were used for the analysis on the basis that a combination of these data sources through triangulation was useful for providing some level of flexibility in arriving at substantive explanations (Yin, 2003) in addressing the research questions. Specifically, the quantitative data

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were analysed by the use of descriptive statistics (i.e., mean and standard deviation) while the qualitative data was analysed in themes. Document analysis was also employed to analyse the PSATs' ICT-supported lesson artefacts (i.e., Activity sheets, lesson plans and presentation slides).

Reflections on the Research Approach

This section presents a reflection on the research approach (i.e., design-based research, DBR) as adopted in the study. The reflections take into consideration the design, development, and try-outs of the intervention in order to validate DBR as the possible approach for improving pre-service teachers' knowledge in developing ICT-based lessons in an interactive way by use of audio-visual materials. In this study, design-based research was considered as an appropriate research approach based on its iterative nature which allowed for a systematic refinement of the ICT-based intervention. This was deemed relevant for gaining valuable insights into how the pre-service accounting teachers developed their knowledge and skills for integrating ICT into the teaching of accounting through the use of audio-visuals in an attempt to make the lesson interactive. DBR was also useful for the formulation of design guidelines that inform theory in order to facilitate prospects in the future development of pre-service teachers' competencies for ICT integration (Agyei, 2012).

Each phase of the DBR approach as situated in the study facilitated the development of an effective ICT-based instructional intervention. This was key to providing a realistic solution to the non-interactive methods of instruction being adopted for the teaching of accounting. For example, the *Conceive* phase provided the opportunity for the researcher to be innovative based on the

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literature reviewed. This was useful in identifying the initial design guidelines. The conceive phase also provided room for experts to ascertain the practicability as well as improve the validity of the exemplary materials which were developed by the researcher; hence, the conceive phase in the study was crucial for the production of a quality ICT-based intervention with features that best fit the Ghanaian classroom context.

The *build* phase and the *test* phase of the DBR approach adapted for the study formed the core of the research. Through the professional development arrangement organised at this stage of the study, the iterative cycle feature of DBR was emphasised. The iterative cycle of the formative evaluation and redesign as done in the professional development arrangements provided room for the researcher to describe the extent to which the designed intervention was implemented as planned. In this regard, the microteaching try-outs and the feedbacks that were given after each try-out became essential to ascertain the effectiveness of the ICT (audio-visual) based intervention.

The final phase of the DBR enabled reflection and documentation about the entire research process. The reflection and documentation of the whole research process enabled theory formulation (i.e., the refined and final design guideline) for the design of an effective ICT- supported audio-visual lessons. Thus, it is important to emphasize that the reflection and documentation phase provided the foundation for explaining how the improvements in the teaching of accounting with ICT, as well as the enhancements in students' understanding of concepts of accounting occur in the ICT implementation process.

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Summary of Key Findings from the Study

Based on the analysis of the results for the four (4) research questions formulated for the study, the following are the summary of the key findings that emerged from the study. The findings are presented in line with the research questions i.e. from research question 1 to 4 respectively.

1. For RQ1, the study revealed the following as the key features of the ICT intervention that can be designed to make the teaching of SHS accounting in Ghana interactive. The intervention should:
   a) *Incorporate technology (in this case, audio-visual materials) to promote interactivity.*
   b) *Lean itself to collaborative learning approach (CLA).*
   c) *Be activity-oriented.*
   d) *Require the teacher to have knowledge of technology to be able to design and enact ICT lessons.*
   e) *Be adaptable in both classroom learning environment where there is internet connectivity and where there is no internet connectivity.*
2. For RQ2, the study revealed that the ICT-intervention was effective in improving pre-service teachers' pedagogical strategies because it reflected all the four constructs (Active, Collaborative, Authentic and Intentional) for measuring the effectiveness of the ICT intervention as conceptualised in the study.
3. In the case of RQ3, the results revealed that the PSATs developed their pedagogical strategies for teaching accounting with the ICT intervention. The improvement in teaching using ICT-supported

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pedagogical strategies was explained in the pre-service teachers developed knowledge and skills in designing and enacting ICT supported lessons (i.e. their developed TPACK) and also developed improved content knowledge of their own subject matter. However, there were some challenges they encountered with the use of audio-visuals.

4. Similarly, for RQ4, the study revealed that the students improved their learning outcomes. The improvement in students' learning of concepts in accounting using ICT-supported pedagogies was explained in the enhanced students' learning outcomes and positive dispositions by the students after their encounter with the ICT-supported intervention for the lessons.

Conclusions

The findings enumerated are discussed highlighting their implications on policy and practice on senior high school accounting education.

Use of audio-visuals in enacting accounting lessons

One feature of the intervention was the incorporation of audio-visual support materials in the lesson to promote interactivity in the classroom. However, the use of audio-visuals in senior high school accounting lessons will have implications on the availability of ICT resources and infrastructure in the school. One major requirement of the 2007 educational reform was to ensure that all students in pre-tertiary institutions in Ghana acquire basic ICT literacy skills (including internet use) and apply these not only in their studies but also in a variety of ways in their everyday life activities (CRDD, 2007). Specifically, the provision of resources such as availability of computers, projectors, internet

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connectivity and access to electricity, among others, would be necessary ingredients to promote successful integration of ICT in the classroom. This obviously will have financial implications on schools and stakeholders of education in the country.

The accounting curriculum for SHS in Ghana does not seem to place much emphasis on the use of ICT in teaching accounting. There are no explicit guidelines of ICT use in practice for teaching the concepts in accounting. However, the findings of the study have revealed that the integration of ICT in teaching and learning has the potentials to enhance students' learning outcomes. The study, therefore, has shown that there is a need to formulate, strengthen and enforce clear ICT policy implementation strategies regarding the practical use of ICT in the accounting curriculum. When specific and effective ICT policies are put in place, ICT use will be promoted and enhanced to ensure that teachers integrate them effectively to bring about the desired improvements in teaching.

Effectiveness of the ICT intervention

The use of the four (4) constructs *active, collaborative, authentic* and *intentional* in the conceptual framework was informed by the need to clearly define interactive teaching in the context of constructivist ideologies for teaching and learning. The four (4) constructs for interactive teaching, therefore, served as the criteria for measuring 'effectiveness' of the ICT-supported intervention for interactive teaching of accounting in the context of the study. It is important to mention however that, for a lesson to be considered as interactive, all the four (4) constructs should be evidenced in the teaching and learning process. The current study proved that the use of interactive teaching approach in the classroom provides: 1) opportunity for each student in the class

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to be engaged in-class activities (*Active);* 2) the platform for students to share ideas with their peers and work together in teams (*Collaborative*); 3) avenue for a teacher to relate concepts in the subject matter to real-life context (*Authentic*); and 4) opportunity for a teacher to monitor students' activities in the classroom and provide prompt feedback to students on their performance of tasks (*intentional).*

The study revealed that the ICT-based lessons that were designed and implemented by the PSATs projected all the four constructs which imply that the ICT intervention was effective in improving teachers' pedagogical strategies to teach in an interactive manner. Undoubtedly, interactive teaching of concepts in accounting has the tendency to enhance students' participation in classroom activities and also sustains their interest in the lesson as was proven in the study.

Teachers' knowledge of technology and pre-lesson preparation

The study also brought to light the essence of teachers' knowledge and skills in ICT for effective integration of technology in teaching. The teacher characteristics such as lack of technology-related skills and negative depositions towards ICT use do not promote technology-oriented teaching and learning environment. The results of the study revealed that at the initial stage of the professional development training for the PSATs, the pre-service teachers indicated that they had weak knowledge of technology in teaching and that created a challenge for them during the initial stage of the training. Lack of technology-based skills is one of the main reasons why teachers shy away from using technology as most of them seem to have gaps in their knowledge where ICT is concerned.

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Fusing ICT into the teaching of accounting at the SHS level will imply that teachers will require much time to carefully plan their lessons. This is because, for example, the integration of audio-visuals in accounting lessons will require the teacher to find some time to search for appropriate audio-visuals that can be integrated into the lesson. This obviously will have implications on the lesson preparation which require the integration of ICT. These highlights are clear indications that the teachers' knowledge and skills in ICT is a requirement for effective use of ICT in teaching. This is because if the teachers lack the necessary knowledge and skills that are ICT-related for their uptake of ICT as an instructional tool, then it will pose as a major challenge to successful ICT initiative and implementation process.

Learning outcomes of students with ICT-supported pedagogical lessons

The study revealed that students learning outcomes of concepts in accounting improved with the use of the ICT-based lessons by the PSATs. This was evidenced by the results of both the pre-test and post-test scores of students during the implementation of the ICT-supported lessons by the PSATs. The results of the study further proved that students expressed positive dispositions towards the ICT-based intervention for accounting lessons. The improvements in students' learning outcomes seem to have resulted from the use of audio-visual materials in the teaching.

Audio-visual materials in a lesson have the potentials to give rise to meaningful concepts enriched by meaningful association. The change in students' dispositions after the implementation of the ICT-based intervention could be attributed to the pedagogical strategies that were employed by the PSATs in the teaching of the ICT-based lessons. The use of activity sheets,

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group presentations and the use of videos in the lessons generally made the lessons interesting and enjoyable for the students.

Contributions of the Study

- *Formulation of design guidelines*

The study has proposed design guidelines to guide practice and training of in-service and pre-service teachers in enacting and implementing ICT-based lessons. The following are the design guidelines that emerged from the study:

1. It is very crucial to develop initial (exemplary) ICT-supported material in the form of lesson artefacts in any design and professional development training for in-service and pre-service teachers. The exemplary material provides practical and authentic samples for teachers to gain an in-depth understanding of what an ICT-based intervention constitutes.
2. Selection of ICT resources that are readily available, user-friendly and content-related (audio-visuals) is crucial for the development of ICT-oriented competencies.
3. Initial professional development training (workshop) is an important means to equip pre-service teachers with ICT-oriented teaching and learning competencies. Thus, the initial workshop for the teachers is considered essential for preparing them to effectively incorporate ICT into their teaching.
4. In any professional development training for pre-service teachers, the approach of grouping them to work in teams in designing and enacting ICT-based lessons is an effective way to groom and support the PSATs' learning with ICT. This motivates them to

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collectively work with their peers which facilitates their way of knowing about the technological tool in mastering the subject matter.

5. Adoption of constructivist pedagogical approaches is key to a successful implementation process with ICT. The constructivist pedagogies provide opportunities for more collaborations and activeness among students in the implementation process.
6. Provision of facilitating modes such as engagement of students' prior knowledge, monitoring of students' activities, and the creation of platforms for discussions are key to the effective implementation of an ICT innovation.

- Unveiling of innovative way to enhance the teaching of accounting in SHS in Ghana.
- Introduction of a new design based research process.

Recommendations

The recommendations are made to provide useful information to inform policy, improve practice and for further research. Based on the findings of the study, recommendations are made to respond to the various actions to be taken by key stakeholders in accounting education. The use of audio-visual materials as an interactive ICT tool for assisting the PSATs to develop their competencies for integrating ICT into the teaching of accounting in SHS was found to be effective and appropriate in the Ghanaian context. The study, therefore, recommends the following for policy, practice and further research.

Recommendations for policy

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1. The Ministry of Education (MoE) and other stakeholders should consider making huge investments in ICT infrastructure in the Ghanaian education sector, especially in Senior High Schools. This will improve the accessibility of ICT resources in senior high schools to promote the effective integration of ICT in teaching accounting. When ICT resources are provided in schools, it will motivate teachers to incorporate technology in their teaching to enhance the teaching and learning process.
2. Again, the Ministry of Education (MoE) through its agent, the National Council for Curriculum and Assessment (NaCCA), should design and outline explicit guidelines for the integration of ICT into the senior high school accounting curriculum to promote effective use of ICT in the senior high school. A well spelt out guidelines for ICT integration in teaching will serve as a guide for teachers whenever they want to incorporate technology in their teaching.

Recommendations for practice

3. Institutions in Ghana mandated to train pre-service accounting teachers should consider using more constructivist pedagogical strategies (Active, Collaborative, Authentic and Intentional) in the training of teachers to equip them to be able to use interactive teaching strategies in their teaching.
4. Furthermore, the Ghana Education Service (GES) should organise regular professional development training (PDT) programmes for practising accounting teachers at the SHS levels to build their capacity for effective integration of ICT in the teaching of accounting.

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Suggestions for further research

1. The eight PSATs involved in the study were Level 300 B. Ed. Accounting (regular) students at the University of Cape Coast for the 2019/2020 academic year. Therefore, it will be valuable to undertake a follow-up study on each of PSATs to examine if the knowledge and skill gained in this study are being utilised in their teaching practices.
2. Even though the study focused on the use of ICT to improve the teaching of accounting in senior high schools in Ghana, the use of technology in the study was limited to the use of audio-visual materials in teaching accounting in an interactive manner. In view of this, I recommend that further studies could be conducted to find out the impact of other technologies such as the use of accounting software (QuickBooks, Tally Accounting, TurboCash etc.) in teaching accounting.
3. Finally, the study could be replicated in a different subject area to determine whether the same results could be ascertained.

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Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

REFERENCES

Abdallah, M. S., & Wegerif, R. B. (2014). *Design-based research (DBR) in educational enquiry and technological studies*: A version for PhD students targeting the integration of new technologies and literacies into educational contexts: ERIC Clearinghouse.

AECT. (2004). *The definition of educational technology.* Washington DC: AECT.

Agama-Sarabia, A., Trejo-Niño, G., De-la-Peña-León, B., Islas-Ortega, M., (2017). Audiovisual aids in nursing education: A literature review. *Enfermeria Global*, *16*(3), 526–538.

Agyei, D. D. (2012). *Preparation of pre-service teachers in Ghana to integrate information and communication technology in teaching mathematics.* Unpublished doctoral dissertation, University of Twente, Enschede, The Netherlands.

Agyei, D. D. (2013). Analysis of technology integration in teacher education in Ghana. *Journal of Global Initiatives: Policy, Pedagogy, Perspective, 8*(1), 5.

Agyei, D. D., & Voogt, J. (2012). Developing technological pedagogical content knowledge in pre-service mathematics teachers through collaborative design. *Australasian Journal of Educational Technology, 28*(4), 547-564.

Ahadiat, N. (2008). Technologies used in accounting education: A study of frequency of use among faculty, *Journal of Education for Business*, *83* (3), 123-134.

 Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Akpotohwo, F. C., & Ezeani, N. S. (2014). Integrating information and communication technology (ICT) in accounting education instruction in Ekiti State Universities. *International Journal of Business and Social Science*, *5*(6), 195–204.

Albrecht, W. S., & Sack, R. J. (2000). Accounting education: Charting the course through a perilous future. *Accounting Education Series*, *16*, 1-72.

Alexander, R. (2001). *Culture and pedagogy: International comparisons in primary education*: Blackwell Publishers Oxford.

Allan, M. K. (2007). Millennial teachers: Student teachers as users of information and communication – A New Zealand case study. *International Journal of Education and Development using Information and Communication Technology, 3*(2), 16-29.

Anamuah-Mensah Committee. (2002). *Meeting the challenges of education in the twenty-first century (Report of the president's committee on review of education reforms in Ghana.* Accra: Adwiwa Publications (Gh) Ltd.

Andriessen, D. G. (2006). *Combining design-based research and action research to test management solutions.* Paper presented at the 7th World Congress Action Learning, Action Research and Process Management, Groningen.

Antwi, M. K. (1992). *Education, society, and development in Ghana.* Accra: Unimax Publishers Ltd.

Antwi, V. (2013). *Interactive teaching of mechanics in a Ghanaian university context.* Doctoral dissertation, Faculteit Bètawetenschappen FIsme, Utrecht University.

 Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Ashaver, D. (2013). The use of audio-visual materials in the teaching and learning processes in Colleges of Education in Benue State-Nigeria. *IOSR Journal of Research & Method in Education (IOSRJRME), 1*(6), 44–55.

Atwater, M. M. (1996). Social constructivism: Infusion into the multicultural science education research agenda. *Journal of Re-search in Science Teaching, 33*, 821-837.

Australian Children's Education and Care Quality Authority (ACECQA) (2012). *National Quality Framework.* Retrieved from http://www.acecqa.gov.au/national-quality-framework.

Avalos, B. (2011). Teacher professional development in teaching and teacher education for over ten years. *Teaching and Teacher Education, 27*(1), 10-20.

Awayiga, J. Y., Onumah, J. M., & Tsamenyi, M. (2010). Knowledge and skills development of accounting graduates: The perceptions of graduates and employers in Ghana. *Accounting Education: an International Journal, 19*(1), 139-158.

Ayebi-Arthur, K., & Tenkorang, E. Y. (2011). ICT integration in teacher education-A study of University of Education, Winneba. *Journal of Science and Mathematics Education, 15*(1), 138-150.

Bain, K. (2004). *What the best college teachers do.* Cambridge, MA: Harvard University Press.

 Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Barab, S., & Squire, K. (2004). Design-based research: Putting a stake in the ground. *The Journal of the Learning Sciences, 13*(1), 1-14.

Barron, B. (2003). When smart groups fail. *Journal of the Learning Sciences, 12*, 307–359.

Baumert, J., Kunter, M., Blum, W., Brunner, M., Voss, T., Jordan, A., Klusmann, U., Krauss, S., Neubrand, M., & Tsai, Y.-M. (2010). Teachers' mathematical knowledge, cognitive activation in the classroom, and student progress. *American Educational Research Journal, 47*(1), 133–180.

Bautista, A., Cañadas, M. C., Brizuela, B. M., & Schliemann, A. D. (2015). Examining how teachers use graphs to teach mathematics during a professional development programme. *Journal of Education and Training Studies, 3*(2), 91-106.

Berge, Z. (1998). Guiding principles in web-based instructional design. *Education Media International, 35* (2), 72-76.

Berliner, D. C. (1992). The nature of expertise in teaching. In F. K. Oser, A. Dick, & J. L. Patry (Eds.), *Effective and responsible teaching: The new synthesis* (pp. 227–248). San Francisco, CA: Jossey-Bass.

Bernauer, J. A. (1995). *Integrating technology into the curriculum: First year evaluation.* Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.(ERIC Document Reproduction Service No. ED385224).

 Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Biggs, J. B. (2003). *Teaching for quality learning at university.* Buckingham: Open University Press/Society for Research into Higher Education.

Boniface, I. B. (2016). Integrating ICT software in the teaching of accounting in tertiary institutions in Rivers State. *International Journal of Humanities and Social Science Invention. 5* (8), 46–50.

Bonk, C. J., & Cunningham, D. J. (1998). *Searching for learner-centred, constructivist, and sociocultural components of collaborative education learning tools: Learner-centred techs for literacy, apprenticeship, & discourse* (pp. 25-50). Mahwah, NJ: Erlbaum.

Bonner, S. (1999). Choosing teaching methods based on learning objectives: An Integrative Framework. *Issues in Accounting Education, 14*(1), 11-39.

Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom.* ASHE-ERIC Higher Education Report, Washington DC: School of Education and Human Development, George Washington University.

Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher, 33*(8), 3-15.

Borthwick, A., Charles, M., Pierson, M., Thompson, A., Park, J., Searson, M. & Bull, G. (2008). *Realizing technology potential through TPACK: Learning and leading with technology* (pp. 23-26).

Bosu, L. (2016). *Teaching practices of accounting teachers in SHSs in Ghana.* Unpublished doctoral thesis, University of Cape Coast, Ghana.

Boudourides, M. A. (1998). *Constructivism and Education: A shoppers guide.* International Conference on the Teaching of Mathematics, Samos, Greece.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Bransford J., Brown A. & Cocking R. (2000). *How people learn: Brain, mind, experience and school* (Ex.Ed.), Washington, DC: National Research Council.Brogdon, G. D. Education, constructivism and virtual reality. http://sites.google.com/site.

Brown, J. S., Collins, A., & Duguid, P. (1996). Situated cognition and the culture of learning. In McLellan, H. (Ed.), *Situated learning perspective*, (pp. 19-44). Englewood Cliffs, NJ: Educational Technology Publications.

Brown, T. H. (2005). Beyond constructivism: Exploring future learning paradigms. *Education Today, 2*(2), 1-11.

Bryderup, I. M., & Kowalski, K. (2002). The role of local authorities in the integration of ICT in learning. *Journal of Computer Assisted Learning, 18*(4), 469–479.

Buchanan, R. (1992). Wicked problems in design thinking. *Design Issues, 8*(2), 5-21.

Buchanan, R. (2001). Design research and the new learning. *Design Issues, 17*(4), 3-23.

Burke, J. D. (1983). Teaching styles in college geography. *Journal of Geography, 82*(6), 255-256.

Carlson, S., & Gadio, C. T. (2005). Teacher professional development in the use of technology. In W.D. Haddad & A. Draxler (Eds.), *Technologies for education: potential, parameters, and prospects*, Paris and Washington, D.C.: UNESCO and AED.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Carpenter, T. P., Fennema, E., Peterson, P. L., Chiang, C. P., & Loef, M. (1989). Using knowledge of children's mathematics thinking in classroom teaching: An experimental study. *American Educational Research Journal, 26*(4), 499–531.

Cassidy, M. F (1982). Toward integration: Education, instructional technology, and semiotics. *Educational Communications and Technology Journal, 20,* 75-89.

Cobb, P., Confrey, J., DiSessa, A., Lehrer, R., & Schauble, L. (2003). Design experiments in educational research. *Educational Researcher, 32*(1), 9-13.

Collins, A. (1991). Cognitive apprenticeship and instructional technology. In L. Idol & B. F. Jones (Eds.), *Educational values and cognitive instruction: Implications for reform* (p. 121–138). Lawrence Erlbaum Associates, Inc.

Confer, C. S. (2000). *Student participation in a process of teacher change: Toward student-centred teaching and learning.* Doctoral dissertation, the State University of New York at Albany.

Cooperstein, S. E., & Kocevar-Weidinger, E. (2004). Beyond active learning: A constructivist approach to learning. *Reference Services Review, 32*(2), 141-148.

Cottel, P.G., & Millis, B.J. (1993). Cooperative structures. *Issues in Education, 8*(1), 40–60.

Cox-Petersen, A. M., & Olson, J. K. (2000). Authentic science learning in the digital age. *Learning and Leading with Technology, 27*(61), 32-35.

 Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

CRDD—Curriculum Research and Development Division (2007a). *Teaching syllabus for information and communications technology (Core): Senior High School.* Accra: Ministry of Education Science and Sports.

CRDD—Curriculum Research and Development Division (2007b). *Teaching syllabus for information and communications technology (Core): Junior High School.* Accra: Ministry of Education Science and Sports.

CRDD—Curriculum Research and Development Division (2007c). *Teaching syllabus for information and communications technology (Core): Primary School.* Accra: Ministry of Education Science and Sports.

Creswell, J. W. (2007). *Advanced mixed methods research designs*. Thousand Oaks, CA: Sage Publications.

Cuban, L. (2006). Getting past futile pedagogical wars. *Phi Delta Kappan, 87*(10), 793-795.

Dandoulakis, G. (1986). *Towards a student-centred teaching of English literature* (ERIC Document Reproduction Service No. ED274200).

Darling-Hammond, L., & McLaughlin, M. W. (2011). Policies that support professional development in an era of reform. *Phi Delta Kappan, 76*(8), 597–604.

Davis, N. E., & Tearle, P. (1999). *A core curriculum for telematics in teacher training.* Retrieved from www.ex.ac.uk/telematics.T3/corecurr/tteach.

Dale, E. (1964). *Audio-visual methods in teaching*. New York: Holt, Rinehart and Winston.

Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher, 38*(3), 181–199.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Desimone, L. M., Porter, A. C., Garet, M. S., Yoon, K. S., & Birman, B. F. (2002). Effects of professional development on teachers' instruction: Results from a three-year longitudinal study. *Educational Evaluation and Policy Analysis*, *24*(2), 81-112.

Dewey, J. (1938). *The Child and the Curriculum*. Chicago & London: University of Chicago Press.

diSessa, A. A., & Cobb, P. (2004). Ontological innovation and the role of theory in design experiments. *Journal of the Learning Sciences, 13*(1), 77-103.

Donnelly, D., McGarr, O., & O'Reilly, J. (2011). A framework for teachers' integration of ICT into their classroom practice. *Computers & Education, 57*(2), 1469-1483.

Dorit, R. (1999). What is Hebrew action normal? *Hebrew Linguistics,* 45.

Duffy, T., & Cunningham, D. (1996). *Constructivism: Implications for the design and delivery of instruction.* Handbook of Research for Educational Telecommunications and Technology (Pp. 170-198). New York: MacMillan.

Earle, R. S. (2002). The integration of instructional technology into public education: promises and challenges, *Educational Technology, 42* (1) 5-13.

Easterday, M. W., Lewis, D. R., & Gerber, E. M. (2014). Design-based research process: Problems, phases, and applications. *Proceedings of International Conference of the Learning Sciences, ICLS, 1,* 317-324.

Eison, J. (2010). *Using active learning instructional strategies to create excitement and enhance learning*. Chicago: ERIC Document Reproduc tion Service.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Entwistle, N. J., & Peterson, E. R. (2004). Conceptions of learning and knowledge in higher education: Relationships with study behaviour and influences of learning environments. *International Journal of Educational Research*, *41*(6), 407-428.

Epstein, A. (2007). *The intentional teacher. Choosing the best strategies for young children's learning*. Washington, D.C: NAEYC.

Ernest, P. (2010). Reflections on theories of learning. In B. Sriraman, & L. English (Eds.), *Theories of mathematics education: Seeking new frontiers,* 39-47. Berlin Heidelberg: Springer Berlin Heidelberg.

Ertmer, P. A. (1999). Addressing first-and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development, 47*(4), 47-61.

Euler, D. (2014). Design-Research – a paradigm under development. In D. Euler & P.F.E. Sloane (Hrsg.). *Design-based research* (15-44). Stuttgart: Franz Steiner Verlag.

Felder, R. M. (1993). Reaching the second tier: Learning and teaching styles in College Science Education, *J. Coll. Sci. Teaching, 23*(5), 286-290.

Fink, L. D. (2003). *Creating significant learning experiences: An integrated approach to designing college courses*. San Francisco: Jossey-Bass

Fortin, A., & Legault, M. (2010). Development of generic competencies: Impact of mixed teaching approach on students' perceptions, *Accounting Education: An International Journal,* 19 (1-2), pp. 93-122.

Frimpong, J. A (1990). *Clinical supervision: The teacher, GNAT*. Accra, pp 10 – 16.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Fu, J. S. (2013). ICT in Education: A critical literature review and its implication. *International Journal of Education and Development using Information and Communication Technology, 9*(1), 112-125.

Gagne, R. M. (2013). *Instructional technology: Foundations*. Routledge.

Galbraith, J. K. (1967). *The new industrial state.* Boston: Houghton Mifflin.

Good, C., & Kappa, P. (1973). *Dictionary of education in the role of audio-visual aids in improving EFL learners' listening skill*: New York: McGraw-Hill.

Good, T. L., & Brophy, J. (2009). *Looking in classrooms*. Boston: Allyn & Bacon.

Gravemeijer, K., & Cobb, P. (2006). Design research from a learning perspective. In Van Den Akker, K, Gravemeijer, J., Mckenney, S., & Nieveen, N., (Eds.). *Educational design research,* (pp.17-51). London: Routledge.

Groff, J., & Mouza, C. (2008). A framework for addressing challenges to classroom technology use. *AACe Journal*, *16*(1), 21-46.

Guskey, T. R. (2002). *Evaluating professional development* (Thousand Oaks, CA, Corwin Press).

Guzel, H. (2011). Factors affecting the computer usage of physics teachers working at private training centers. *Turkish Online Journal of Educational Technology-TOJET, 10*(2), 122-132.

Haddad, W. D (2003). *Is Instructional technology a must for learning*? Oakton: Knowledge Enterprise Inc.

Hale, K. V. (2005). Gender differences in computer technology achievement. *Meridian: A Middle School Computer Technologies, 8*(1), 13-21.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Hall, J., & Saunders, P. (1997). Adopting a student-centred approach to management of learning. In C. Bell, M. Bowden, and A. Trott (Eds.), *Implementing flexible learning*. London: Kogan Page.

Hall, S. (2006). The future of Identity. In S.P. Hier & B. Singh. *Bolaria identity and belonging: Rethinking race and ethnicity in Canadian society.* Toronto: Canadian Scholars' Press, p. 249-269.

Harder, H. (2012. Explanatory case study research. In A. J. Mills, G. Durepos & E. Wiebe (Eds.). *Encyclopaedia of case study research*. SAGE Publications, Inc.

Harris, J., & Hofer, M., (2009). *Testing a TPACK-based technology integration observation instrument.* Paper presented at the Proceedings of Society for Information Technology & Teacher Education International Conference, Chesapeake, VA: AACE.

Harris, J., Mishra, P., & Koehler, A. M. (2009). Teachers' Technological Pedagogical Content Knowledge and learning activity types: Curriculum-based technology integration reframed. *Research on Technology in Education, 41*(4), 393–416.

Harris, S. (2002). Innovative pedagogical practices using ICT in schools in England. *Journal of Computer Assisted Learning*, *18*(4), 449-458.

Hein, G. E. (1991). Constructivist learning theory. Paper presented at CECA (*International Committee of Museum Educators*) Conference. Jerusalem Israel, 15-22.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Hendriks, M. A., Luyten, H., Scheerens, J., Sleegers, P., & Steen, R. (2010). *Teachers' professional development: Europe in international comparison.* Luxembourg: Office for Official Publications of the European Union.

Herod, L. (2012). *Adult learning: From theory to practice*. Retrieved from http://en.copian.ca/library/learning/adult_learning/adult_learning.pdf.

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development*, *55*(3), 223-252.

Ho, A., Watkins, D., & Kelly, M. (2001). The conceptual change approach to improving teaching and learning: An evaluation of a Hong Kong staff development programme. *Higher Education 4* (2), 143-169.

Hopkins, D. (2002). *Improving the quality of education for all.* London: Routledge.

Hoyle, R. (2011). *Assessment of self-regulation and related constructs*. Paper presented at NRC Workshop on Assessing 21st Century Skills, Irvine, CA.

Hutchison, A., & Reinking, D. (2011). *A national survey of barriers to integrating information and communication technologies into literacy instruction.* 59th yearbook of the National Reading Conference. Milwaukee, WI: National Reading Conference.

Jain, P. (2004). *Educational technology*. Delhi Moujpur publication.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Janssen, J., Erkens, G., Kanselaar, G., & Jaspers, J. (2007). Visualization of participation: Does it contribute to successful computer-supported collaborative learning? *Computers & Education, 49*, 1037–1065.

Janssen, J., Erkens, G., Kirschner, P. A., & Kanselaar, G. (2010). Effects of representational guidance during computer-supported collaborative learning. *Instructional Science, 38*, 59–88.

Jebeile, S. H., & Abeysekera, I. (2010). The spread of ICT innovation in accounting education. *International Journal of Teaching and Learning in Higher Education, 22* (2), 158-168.

Jimoyiannis, A. (2008). Factors determining teachers' beliefs and perceptions of ICT in education. *In Encyclopaedia of Information Communication Technology, 1,* 321-334. New York: Information Science Reference.

Johnson, D. W., Johnson, R. T., & Smith, K. A. (2014). Cooperative learning: Improving university instruction by basing practice on validated theory. *Journal on Excellence in University Teaching, 25* (3&4) 1-26.

Jones, M. G., & Brader-Araje, L. (2002). The impact of constructivism on education: Language, discourse, and meaning. *American Communication Journal,* 5(3), 1-10.

Jonassen, D., & Reeves, T. (1996). Learning with technology: Using computers as cognitive tools. In D. Jonassen (Ed.), *Handbook of research educational on educational communications and technology* (pp 693-719). New York: Macmillan.

Kazemi, E., & Hubbard, A. (2008). New directions for the design and study of PD: Attending to the coevolution of teachers' participation across contexts. *Journal of Teacher Education, 59*(5), 428-441.

Digitized by Sam Jonah Library

Kelly, M. (2001). The conceptual change approach to improving teaching and learning: An evaluation of a Hong Kong staff development programme . *Higher Education 42*, 143–169.

Kelly, A. E. (2010). When is design research appropriate? In T. Plomp, & N. Nieveen (Eds.), *An introduction to educational design research*, Enschede: Netzodruk.

Kelly, J. (1985). *Student-centred teaching for increased participation.* (ERIC Document Reproduction Service No. ED260033).

Kelly, W., & Serb, T. J. (1961). *Audio-visual aids and equipment*. Chicago: American Society of Planning Officials.

Kenney, R., Shoffner, M., & Norris, D. (2014). Reflecting on the use of writing to promote mathematical learning: An examination of preservice mathematics teachers' perspectives. *Teacher Educator, 49*(1), 28-43.

Keppell, M. J., Au, K. O. E., Ma, W. W. A., & Chan, M. S. C. (2005). *Development-based research and professional development.* Proceedings of Ascilite Conference, 337 – 344.

Khan, M. S. H., Hasan, M., & Clement, C. K. (2012). Barriers to the introduction of ICT into education in developing countries: The example of Bangladesh. *International Journal of Instruction, 5*(2), 1308-1470.

Kishor, N. (2003). *Educational technology*. UK: Abhishek publication.

Koehler M., & Mishra P. (2005). *Introducing TPCK. in AACTE committee on innovation and technology (Eds.).* Handbook of technological pedagogical content knowledge (TPCK) for educators, pp. 3-29. New York: Routledge.

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Koehler M., & Mishra P. (2009). What is technological pedagogical content knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education, 9,* 60-70.

Koehler, M. J., Mishra, P., & Yahya, K. (2004). *Content, pedagogy, and technology: Testing a model of technology integration.* Paper presented at the annual meeting of the American Educational Research Association, April 2004, San Diego, CA.

Koh, J. H .L. (2013). A rubric for assessing teachers' lesson activities with respect to TPACK for meaningful learning with ICT. *Australasian Journal of Educational Technology, 29*(6), 887-900.

Kruse, J. (2009). Learning theories: Pillars of teacher decision-making. *Iowa Science Teachers Journal, 36*(2), 2-7.

Kunari, C. (2006). *Methods of teaching educational technology*. New Delhi.

Kwarteng, J. T. (2013). The degree of fidelity of the 2007 Education Reform Implementation. *Journal of Arts and Humanities, 2*(1), 149–154.

Lai, C. H., Yang, J. C., & Chen, F. C., (2007). Affordances of mobile technologies for experiential learning: the interplay of technology and pedagogical practices. *Computer Assisted Learning, 23*(4), 326-337.

Lea, S. J., Stephenson, D., & Troy, J. (2003). Higher education students' attitudes to student-centred learning: Beyond 'educational bulimia'? *Studies in Higher Education, 28*(3), 321-334.

Lebow, D. (1993). Constructivist values for instructional systems design: Five principles toward a new mindset. *Educational Technology, Research and Development, 41*(3), 4-16.

 Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Lestage, A. (2009). *The use of audio-visual aids in education: Extracted from UNESCO chronicles, regional seminar on the use of audio-visual aids in adult and school education.* Latin America at Mexico City.

Levy, S. (1995). How the propeller heads stole the electronic future. *New York Times Magazine*, pp. 58– 59.

Lewis, C., Perry, R., & Murata, A. (2006). How should research contribute to instructional improvement? The case of lesson study, *Educational Researcher, 35* (3), 3-14.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry.* Newbury Park, CA: Sage Publications.

Lonka, K., & Ahola, K. (1995). Activating instruction: How to foster study and thinking skills in higher education, *European Journal of Psychology of Education, 10*(4), 351-368.

Lowenthal, P., & Muth, R. (2008). *Constructivism: Encyclopaedia of the social and cultural foundations of education,* 177-179. Thousand Oaks, CA: SAGE Publication.

Lunenberg, F. (1998). Constructivism and technology: Instructional designs for successful education reform. *Journal of Instructional Psychology, 25*(2), 75-83.

Majumdar, S. (2002). *Network-based flexible learning: Prospects and challenges in the 21st Century.* Invited keynote address at the International Conference of Vocational Education and Training (IVETA'97), Helsinki, Finland. Helsinki, Finland. August, 24-28.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Manfra, M. M., & Hammond, T.C. (2008). Teachers' instructional choices with student created digital documentaries: Case studies. *Journal of Research on Technology in Education, 41*(2), 223-245.

Mckean, S. (2014). *The Effects of Implementing Student-Centred Learning on At-Risk Students' Self-Efficachttps*://tspace/McKean.

Mckenney, S., Nieveen, N., & Van Den Akker, J, (2006*). Design research from a curriculum perspective.* London: Routledge.

McKenney, S., & Reeves, T. C. (2012). *Conducting educational design research.* London: Routledge.

Means, B., & Olson, K. (1995). *Technology's role within constructivist classrooms.* Menlo Park, CA: SRI International. *ERIC Document Reproduction Service No. ED, 383283.*

Merriam, S. B. (1998). *Qualitative research and case study applications in education: Revised and expanded from* case study research in education. Jossey-Bass Publishers, San Francisco.

Mingfong, J. YamSan, C., & Ek Ming, T. (2010*). Upacking the design process in design-based research.* In Proceedings of the 9th International Conference of the Learning Sciences (vol.2). International Society of the Learning Science, Chicago, IL.

Mishra, P. & Koehler, M. J., (2013). What is technological pedagogical content knowledge (TPACK)? *Journal of Education, 193*(3), 13-19.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers' College Record, 108*(6), 1017-1054.

Mohanty, J. (2001). *Educational technology*. New Delhi: Rajouri garden.

 Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Mordedzi, B. & Mireku, V. (2015). Senior high school students' learning styles in cost accounting in Ghana. *International Journal of Management, IT and Engineering, 5*(6), 6-13.

Moseley, D., Higgins, S., Bramald, R., Hardman, F., Miller, J., Mroz, M., & Halligan, J. (1999). *Ways forward with ICT: Effective pedagogy using information and communications technology for literacy and numeracy in primary schools.* London: Teacher Training Agency.

Mumtaz, S. (2000). Factors affecting teachers' use of information and communications technology: A review of the literature. *Journal of Information Technology for Teacher Education, 9*(3), 319-342.

Mundry, S. (2005). *What experience has taught us about professional development?* Eisenhower Mathematics and Science Consortia and Clearinghouse Network.

Naidoo, V. (2003). *ICT in education policy-reflecting on key issues*. Paper presented at the ICTs in African Schools Workshop, Gaborone, Botswana.

Nasir, N. I. S. (2007). Identity, goals, and learning: *Mathematical Thinking and Learning, 4*(2-3), 213-247.

Neale, P., Thapa, S., & Boyce, C. (2006). *Preparing a case study: A guide for designing and conducting a case study for evaluation input*. Watertown, MA: Pathfinder International.

Nelson, K. (2010). *Trends in policies, programs and practices in the Australasian first year experience literature 2000-2010 (The first year in higher education research series on evidence-based practice, no.1).* Brisbane, Australia: Queensland University of Technology.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Nicaise, M., Gibney, T., & Crane, M. (2000). Towards an understanding of authentic learning: Student perceptions of an authentic classroom. *Journal of Science Education and Technology, 9*(1), 79-94.

Nieveen, N. (2010). Formative evaluation in educational design research. In Plomp, T. & Nieveen, N. (Eds.), *An introduction to educational design research,* 89-101. Enschede: Netzodruk.

Nihuka, K. A. (2011). *Collaborative course design to support e-learning implementation by instructors.* Doctoral dissertation, University of Twente, Enschede

Ogawa, M. (2001). *Building multiple historical perspectives: An investigation of how middle school students are influenced by different perspectives.* Doctoral dissertation, University of Georgia.

Ohiwerei, F. O., Azih, N., & Okoli, B. E. (2013). Problems militating against utilization of ICT in teaching of business education in Nigerian Universities. *European International Journal of Science and Technology, 2*(7), 78-82.

Opfer, V. D., & Pedder, D. (2011). Conceptualizing teacher professional learning. *Review of Educational Research, 81*(3), 376-407.

Ormrod, J. E. (2004). *Human learning* (4th ed.). Upper Saddle River, NJ: pearson-Merrill Prentice-Hall.

Osborne, J. F. (1993). *Beyond constructivism.* Ithaca, NY: Misconceptions Trust Publisher.

Ottevanger, W. J. W. (2001). *Teacher support materials as a catalyst for science curriculum implementation in Namibia.* Enschede: University of Twente.

Digitized by Sam Jonah Library

Oyekan, S.O. (2000). Fundamentals in education. In: Osisa, W. (ed) *Education for Nigeria Certificate in Education.* Ondo: Adeyemi College of Education Textbook Development Board

Pascal, G., & Paul, D. (2011), *Teaching art in the neoliberal realm: Realism versus cynicism.* Valiz: Amsterdam.

Pascarella, E. T. & Terenzini, P. T. (2005). *How college affects students: A third decade of research.* San Francisco: Jossey-Bass.

Passman, R. (2000). *Pressure cooker: Experiences with student-centred teaching and learning in high-stakes assessment environments.* (ERIC Document Reproduction Service No. ED440116).

PDST, (2017). *An Integrated approach to learning, teaching & assessment*: *Dublin.* Retrieved from www.pdst.ie/publications and www.pdst.ie/pedagogy.

Peeraer, J., & Van Petegem, P. (2011). ICT in teacher education in an emerging developing country: Vietnam's baseline situation at the start of 'The Year of ICT.' *Computers and Education, 56*, 974–982.

Pelgrum, W. J., & Plomp, T. (1991). *The use of computers in education worldwide: results from the IEA 'Computers in Education' survey in 19 educational systems.* Oxford [etc.]: Pergamon Press.

Penuel, W. R., Fishman, B. J., Yamaguchi, R., & Gallagher, L. P. (2007). What makes professional development effective? Strategies that foster curriculum implementation. *American Educational Research Journal, 44*(4), 921-958.

Petraglia, J. (1998). *Reality by design: The rhetoric and technology of authenticity in education.* Mahwah, NJ: Lawrence Erlbaum Associates.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Philip, H. (2000). *Achieving quality education for all, education in the Asia-Pacific Resion: Issues, concerns and prospects:* Springer.

Plomp, T. (2010). Educational design research: An introduction. In Plomp, T. & Nieveen, N. (Eds.), *An introduction to educational design research,* 1-35. Enschede: Netzodruk.

Polly, D., Mims, C., Shepherd, C. E. & Inan, F. (2010). Evidence of impact: Transforming teacher education with preparing tomorrow's teachers to teach with technology (PT3) grants. *Teaching and Teacher Education: An International Journal of Research and Studies, 26*(4), 863-870. Elsevier Ltd.

QCAA, (2014). *Principles of quality assessment*.www.qcaa.qld.edu.au/k-12-policies/student-assessment/understanding assessment.

Rao, T. S., & Jyoti, A. A. V. (2012). Utilisation of audio-visual aids at Government Primary School in Vishakhapattnan District, Andhra Pradesh. *International Journal of Multidisciplinary Educational Research, 1*(2), 311–318.

Rather, A. R. (2004). *Essentials instructional technology*. Darya Gaj: New Delhi. Englewood Cliffs, New Jersey: Educational Technology Publications.

Rautrao, S. (2012). Significance of audio-visual aids in teaching English. Indian Streams *Research Journal, 2*(9).

Reeves, T. C. (1997). Effective dimensions of interactive learning on the World Wide Web. In B. H. Khan (Ed.), *Web-based instruction* (pp. 59-66).

Reiser, R., & Dempsey, J. (2002). *Trends and issues in instructional design and technology*. Upper Saddle River, NJ: Merrill Prentice Hall.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Resnick, L. B. (1987). The development of mathematical intuition. In M. Perlmutter (Ed.), *Minnesota symposium on child psychology*, pp. 159–194). Hillsdale, NJ: Erlbaum

Resta, P., & Laferrière, T. (2007). Technology in support of collaborative learning. *Educational Psychology Review*, *19*(1), 65-83.

Richey, R. C., & Klein, J. D. (2005). Developmental research methods: Creating knowledge from instructional design and development practice. *Journal of Computing in Higher Education, 16*(2), 23-38.

Robinson, T., & Tang, T. (2005). Economics students' perception of their learning context, in Chueng, S. (Ed.), *Innovation for student engagement in Economics.* Proceedings of the Eleventh Australasian Teaching Economics Conference. Sydney, Australia.

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context.* Oxford University Press.

Romme, A. G. (2003). Making a difference: organization as design. Organizati on Science: *A Journal of the Institute of Management Sciences, 14*, 558-573.

Rosnaini, M., & Mohd, A. H. I. (2008). *Factors influencing ICT integration in the classroom: Implication to teacher education.* EABR & TLC Conference Proceeding. Austria.

Saima, R., Qadir, B., & Shazia, B. (2011). A Study to analyse the effectiveness of audio visual aids in teaching learning process at University Level. *Procedia-Social and Behavioral Sciences, 28*, 78-81.

Salomon, G., & Perkins, D. N. (1998). Individual and social aspects of learning. *Review of Research in Education, 23,* 1- 24.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J., & Shin, T. S. (2009). *Examining preservice teachers' development of technolog ical pedagogical content knowledge in an introductory instructional technology course*. Chesapeake, VA: Association for the Advancement of Computing in Education (AACE).

Selwyn, N. (2007). The use of computer technology in university teaching and learning: A critical perspective. *Journal of Computer Assisted Learning, 23*(2), 83–94.

Semmar, Y. (2000). *Teachers' response to second language writing: A humanistic, student-centred approach to the ESL conference*. Doctoral dissertation, California State University, Long Beach.

Shavelson, R., & Towne, L. (2003). *Scientific research in educational.* Washington DC: National Academy Press.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 4-14.

Singh, Y. K. (2005). *Instructional technology in education*. New Delhi: Darya ganj.

Siraj-Blatchford, I., Sylva, K., Muttock, B., Gilden, P. & Bell, E. (2002). *The EPPE case studies.* Technical Paper 10 University of London, Institute of Education/DfEE (forthcoming).

Sjoberg, S. (2007). *Constructivism and learning: International encyclopaedia of education (3rd Ed.).* Oxford: Elsevier.

Smeets, E. (2005). *Does ICT contribute to powerful learning environments in primary education? Computers and Education, 44*(3), 343-355.

 Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Snoeyink, R., & Ertmer, P. A. (2001). Thrust into technology: How veteran teachers respond. *Journal of Educational Technology Systems, 30*(1), 85-111.

Sosin, K., B. Blecha, J. Agarwal, R. Bartlett, L. and Daniel, J. I. (2004). Efficiency in the use of technology in economic education: Some preliminary results. *American Economic Review, 94*, 253-58

Stout, M. J. (2004). *Students as historical detectives: The effects of an inquiry teaching approach on middle school students' understanding of historical ideas and concepts.* Doctoral dissertation, University of Maryland College Park.

Strommen, E. F., & Lincoln, B. (1992). Constructivism, technology, and the future of classroom learning. Education and Urban Society, 24, 466-476.

Sutherland, W. J. (2004). The need for evidence-based conservation. *Trends in Ecology and Evolution, 19*(6), 305–308. https://doi.org/10.1016/j.tree

Taber, K. S. (2011). Constructivism as educational theory: Contingency in learning, and optimally guided instruction. In J. Hassaskhah (Ed.), *Educational Theory,* 39-61. Hauppauge, NY: Nova Science Publishers, Inc.

Taiwo, J. N., & Edwin, A. A. (2016). Effect of ICT on accounting information system and organizational performance. *European Law Review, 8*(6), 01–10.

Tamakloe, E. K, Amedahe F. K., & Atta E. T. (2005). *Principles and methods of teaching.* Accra: Ghana Super Trade Complex Ltd.

Tamkloe, E. K., Atta, E. T., & Amedahe, F. K. (1996). *Principle and Methods of Teaching.* Accra: Black Mask Ltd.

Digitized by Sam Jonah Library

Teasley, S. D., & Roschelle, J. (1993). Constructing a joint problem space: The computer as a tool for sharing knowledge. In S. P. Lajoie & S. D. Derry (Eds.), *Computers as cognitive Tools* (pp. 229-258). Hillsdale, NJ: Erlbaum.

Tessmer, M. (1993). *Planning and conducting formative evaluations: Improving the quality of education and training.* Abingdon, Oxon: Routledge

Tetzlaff, T. (2009). *Constructivist learning verses explicit teaching: A personal discovery of balance.* Master's Synthesis Project, University of Massachusetts Boston.

Thompson, A., & Mishra, P. (2007). Breaking news: TPCK becomes TPACK! *Journal of Computing in Teacher Education, 24*(2), 38-39.

Tilya, F. (2008). IT and educational policy in the sub-Saharan African region. In J. Voogt, & G. Knezek (Eds.), *International handbook of information technology in primary and secondary education* (pp. 1145–1159). New York, NY: Springer.

The West African Examinations Council [WAEC], (2012). *Chief examiners' report. Financial Accounting programme:* May/June West African senior school certificate examination. Accra: WAEC.

The West African Examinations Council [WAEC], (2013). *Chief examiners' report. Financial Accounting programme:* May/June West African senior school certificate examination. Accra: WAEC.

The West African Examinations Council [WAEC], (2014). *Chief examiners' report. Financial Accounting programme:* May/June West African senior school certificate examination. Accra: WAEC.

University of Cape Coast https://ir.ucc.edu.gh/xmlui

The West African Examinations Council [WAEC], (2015). *Chief examiners' report. Financial Accounting programme:* May/June West African senior school certificate examination. Accra: WAEC.

The West African Examinations Council [WAEC], (2016). *Chief examiners' report. Financial Accounting programme:* May/June West African senior school certificate examination. Accra: WAEC.

Torre, D. M., Daley, B. J., Sebastian, J. L., & Elnicki, D. M. (2006). Overview of current learning theories for medical educators. *The American Journal of Medicine, 119*(10), 903-907.

Trochim, W. (2000). *The research method knowledge base. 2nd Edition,* Cincinnati: Atomic Dog Publishing.

UNESCO (2002). *Information and communication technology in education: A curriculum for schools and programme for teacher development*. Paris: UNESCO.

Usman, A. (2008). Handbook general principles and methods in education: *Journal of Educational and Social Research, 2*(4), *23-31.*

Van Den Akker, J. (1999). Principles and methods of development research. In Van Den Akker, J., Nieveen, N., Branch, R. M., Gustafson, K. L., & Plomp, T. (Eds.), *Design methodology and developmental research in education and training,* 1-14. Kluwer Academic Publishers: The Netherlands.

Visscher-Voerman, I., & Gustafson, K. L. (2004). Paradigms in the theory and practice of education and training design. *Educational Technology Research and Development, 52*(2), 69-89.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Vygotsky, L. (1978). Interaction between learning and development. In Gauvain & Cole (Eds.). *Reading on the development of Children*, 34-40. New York: Scientific American Books.

Wahab, R. A., Dangi, M. R. M., Latif, N. E. A., Mad, S., & Noor, R. M. (2017). Technology- based accounting education: Evidence on acceptance and usage. *Advanced Science Letters*, *23*(8), 7737–7741.

Walker, D. (2006). Towards productive design studies. In Van Den Akker, J., Gravemeijer, D., Mckenney, S., & Nieveen, N., (Eds.). *Educational Design Research,* 8-14. New York: Routledge.

Wallhead, T. L. (2004). *A didactic analysis of student content development during the peer-assisted learning tasks of a unit of sports education.* Doctoral dissertation, The Ohio State University.

Wang, F., & Hannafin, M. J. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research and Development,* 53(4), 5-23.

Watkins, C., & Mortimore, P. (1999). Pedagogy: what do we know? In: *Mortimore P* (Ed.) *Understanding Pedagogy and its Impact on Learning*. London: Paul Chapman/Sage.

Webb, N., Nemer, K., Chizhik, A., & Sugrue, B. (1998). Equity issues in collaborative group assessment: Group composition and performance. *American Educational Research Journal*, *35*, 607-651

Westbrook J., N. Durrani, R. Brown, D. Orr, J., Pryor, J., Boddy, F. & Salvi. (2013). *"Pedagogy, curriculum, teaching practices and teacher education in developing countries."* Final report, education rigorous literature, UK: University of Sussex:

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Wheeler, S. (2001). Information and communication technologies and the changing role of the teacher. *Journal of Educational Media, 26*(1), 7-17.

Williams, D. Z. (1994) Reforming accounting education. *Journal of Accountancy, 176*(2), 76-82.

Wilson, B. G. (2010). Constructivism in practice and historical context. In Reiser, B & Dempsey, J. (Eds.), *Current trends in instructional design and technology* (3rd ed.), 1-11. Upper Saddle, NJ: Pearson Prentice Hall.

Wilson, S. M. & Peterson, P. L. (2006). *Theories of learning and teaching: What do they mean for educators?* Working Paper. National Education Association Research Department. 1201 16th Street NW, Washington, DC 20036.

Wolmarans, H. P. (2000). Simulation games in management education: An educational technique with great potential? *Management Dynamics, 9* (4), 1-33.

Woodward, K. (2002). *"Roots and routes" in understanding identity*. Great Britain: Hodder Education (part of Hachette Livre UK), p. 135-157.

Yin, R. K. (1984). *Case study research: Design and methods*. Newbury Park: Sage Publications,

Yin, R. K. (2003). *Case study research: Design and methods*. (2nd Ed.). Thousand Oaks.CA: Sage.

Yin, R. K. (2009). *Case study research: Design and methods (*4th Ed.). Thousand Oaks, CA: Sage.

Yusuf, M. O. (2005). Information and communication technologies and education: Analyzing the Nigerian National Policy for Information echnology. *International Education Journal, 6*(3), 316-321.

Digitized by Sam Jonah Library

University of Cape Coast https://ir.ucc.edu.gh/xmlui

Zarei, E., Kargar, E. F., & Bazyar, S. (2014). The level at which accounting professors use information technology at universities. *International Journal of Academic Research in Accounting Finance and Managemet Sciences*, *4*(2), 312–319.

Zhao, Y. & Cziko, G. A. (2001). Teacher adoption of technology: a perceptual control theory perspective. *Journal of Technology and Teacher Education. 9*(1), 5-30.

Zhao, Y., Pugh, K., Sheldon, S., & Byers, J. L. (2002). Conditions for classroom technology innovations. *Teachers College Record, 104*(3), 482-515.

Zhu, Z. T., (2003). On educational informatisation and the transforms of educational cultures. *Journal of Global Chinese Society of Computers in Education*. 1(3), 55-67.

Zollo, M., & Winter, S. (2002). Deliberate learning and evolution of dynamic capabilities. *Organisation Science*, *13*(3), 339-351.

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APPENDICES

APPENDIX A1

Intervention 1 (First Exemplary Material)

Subject	Accounting	Class/Form	SHS 3
Topic	Accounting Equation	Duration	120 mins (2 periods)
Overview of lesson: In this lesson, the following support materials are developed for effective execution of the lesson. 1) PowerPoint slides —which the teacher will use to introduce the topic and also present summaries of lesson activities; 2) Lesson plan; which shows a step by step organization of the lesson to be conducted; 3) Student activity sheet; and 4) Assignment sheet. The activity sheets are designed in line with the lesson objectives and aimed to promote student-centered approach to teaching.			
Instructional Objectives	By the end of the lesson, the student will: 1. acquire knowledge of Asset, Liability and Capital 2. appreciate the effects of transactions on Accounting Equation 3. develop skills in classifying assets and liabilities		
Interactive learning Objectives	Through the use of Audio-Visual Materials in the lesson, students will be able to: • observe different types of assets and liabilities • state the accounting equation in different forms		
Skills	Students will use analytical, critical and observation skills to explain the effects of transactions on the accounting equation.		
Knowledge	Students will learn how to: ▪ write the accounting equation for a particular transaction ▪ classify assets and liabilities into their various types ▪ explain assets, liabilities and capital		
Attitude	▪ critical thinking and active participation ▪ Collaboration: students to work together in teams to solve accounting equation problems.		
Relevant Previous knowledge	Students can identify some properties that their parents have acquired in the house and for their businesses.		
Resources	***ICT:***		

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	• downloaded images and videos from YouTube (assets, liabilities and capital) on accounting equation for demonstration • Presentation software (Microsoft PowerPoint) • Projector • Laptop **NB:** This lesson assumes that there is no internet in the classroom thus, the teacher downloads videos and images onto the computers to be used offline in the classroom for demonstration. **Other resources** • calculator • Copies of activity sheets for each student or small group of students

Lesson Plan

	Teacher Activity	*Student Activity*
Introduction (15 minutes)	• The teacher begins the lesson by asking students to mention some properties their parents have acquired. • The teacher again writes the mathematical equation: $y = 2x + 8$ on the board and asks students to make "x" the subject of the equation. • The teacher then proceeds and introduce the topic for the lesson as "The Accounting Equation" projects it on the board.	• Students answer the question by mentioning some of the items found in their respective homes. • Students solve the question based on their previous knowledge from core mathematics. • Students listen to the teacher and write the lesson objectives in their books.

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	• By use of PowerPoint presentation, the teacher: - shares the lesson objectives with the students.	
Lesson Development (*new knowledge, reinforcements, and reflections*) (80 minutes)	***Activity 1**: Definition of Asset, Liability and Capital (20 minutes)* • In order for students to acquire new knowledge of asset, liability and capital on their own, the teacher guides students to do an activity in groups of three: • the teacher presents a case study of a business man who wanted to start a business with a limited resources to students on activity sheet 1 for students to brainstorm and provide some missing information. • After *activity 1*, teacher asks each group to share their answers with the whole class for discussion.	• Students read the case study carefully and then answer the question on activity sheet (*under activity 1*) based on their own understanding of the case. • Students share ideas by discussing their answers to the questions under *activity 1* (see activity sheet) with their colleagues. ***Some discussion points expected from students:*** • He can borrow the additional money from a friend or a family member.

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	Activity 2: *The Accounting Equation and the effects of transactions on the equation (20 minutes)* • Through discussion, teacher guides students to state the accounting equation it its various forms as: 1. Assets = Capital (where there are no liabilities) 2. Assets = Liabilities (where all resources were obtained on credit) 3. Assets = Capital + Liabilities • Using the Jigsaw method (where each member in a group has a home group and a learning group), teacher groups students into groups of four and asks students to write the different ways in which the accounting equation could be restated.	• Students apply their prior knowledge from change of subject (making variables the subject) in mathematics and rewrite the accounting equation and solve for the value of missing figures on activity sheet in their learning groups (see activity 2) • Students break into their respective home groups and share their ideas by discussing their answers to the questions on the activity sheet under *activity 2* with their colleagues. • Some expected responses for discussion: • Assets – Liabilities = Capital

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		• Assets – Capital = Liabilities • Capital = Assets
	• After *activity* 2, teacher asks students to break into their home group to share their answers (from learning groups) with their colleagues for discussion.	• Students write down the key accounting concepts in the activity as teacher summarizes for revision purposes.
	• Teacher then summarizes the basic accounting principles and concepts in the activity.	• Students make contributions to class discussions and mention some of the assets and liabilities of their parents that they know.
	Activity 3 Classifications of Assets and Liabilities *(40 minutes)* • For students to able to acquire knowledge of the classification of assets and liabilities into their various types, through discussion the teacher assists students to classify assets and	• Students listen and watch the visuals of non- current and current assets and liabilities as the teacher show the images.

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	liabilities their parents into: ♦ Non – current assets ♦ Current assets ♦ Long term liabilities / Non – current liabilities ♦ Current liabilities • Teacher explains to students the meaning of the various classifications of assets and liabilities. • Through PowerPoint presentation, the teacher shows images and videos of some of the non-current and current assets and liabilities to students for students to have a visual view of some of the non-current and current assets and liabilities of businesses. • In groups of four, teacher then asks students to work on activity 3 whiles he goes round and monitor groups' activities and provides necessary assistance to groups accordingly. • After *activity 3*, teacher asks each group's leader to present their group's solution to the questions in activity 3 on the board and explain to the whole class the procedures involved in arriving at their answers.	• Students apply their knowledge gained from the lesson to solve the questions on activity sheet (under activity 3) • Group leaders present their answers to questions under activity 3 on the board and share with their colleagues the steps involved in arriving at their answers. • Students write down the key accounting concepts in the activity as teacher summarizes for revision purpose and ask questions for more insights into the solution to the problem

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	• Teacher then summarizes the steps involved in solving the problem in activity 3 by highlighting on the key accounting concepts and principles.	
Conclusion, Evaluation and Feedback (25 minutes)	Finally, teacher sums up the whole lesson by highlighting the key concepts discussed as follows: • Assets are resources owned and controlled by the business arising from past event which has future benefits. Assets may be current or non-current • Liabilities are resources owed by a business to any person or business who has provided funds for the short or long term. • Capital is the amount invested in a business by the owner. • Non-current assets are assets that are permanently acquired by the business for the purpose of generating income. It is normally used in the business for more than one financial year. • Non-current assets may be tangible or intangible. Example include; Buildings, Plant and machinery, Motor vehicle, Furniture and fittings and Goodwill. • Constituents of accounting equation are: Assets = Equity Capital + Liabilities, Liabilities = Assets – Equity Capital,	Students take notes and then ask questions for more clarification where necessary.

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	Equity Capital = Assets – Liabilities, Assets = Equity Capital (where there are no liabilities), Assets = Liabilities (where all resources we were obtained on credit) Teacher then ends the lesson by • asking students questions based on the instructional objectives of the lesson • inviting questions from students • giving assignment sheets to students	• Students provide feedback responses to teacher's questions and then take assignment sheets to be solved as homework.

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ACCOUNTING (SHS 1)

THE ACCOUNTING EQUATION

Activity sheet

Introduction

In this activity sheet, you have been provided with three activities that is; activity 1, activity 2 and then, activity 3. These activities are designed in such a way that, after going through the activities, you will be equipped with the necessary skills and knowledge needed to explain and classify assets and liabilities as well as stating the accounting equation in different forms. You will also be able to use the accounting equation to calculate for the value of either the assets, liabilities or capital of any business.

Note: all activities are to be done in groups.

Activity 1: Definition of Assets, Liabilities and Capital

Instruction

In this activity, you are presented with a case study, read the case carefully and answer the questions that follows.

Case Study

Ben, an entrepreneur intends to open a supermarket in Cape Coast. He will have to buy certain properties to enable him set up the business. For the supermarket, Ben has to buy a shop, stock, furniture, computer and a delivery van. All these properties will be used in generating income for the supermarket. In Ben's estimation, he will need a total of GHS 300,000.00 to buy all the things he will need to establish the supermarket. Currently he has only GHS 100,000.00 in his bank accounts which he managed to save over the years with Ghana Commercial Bank.

1. In what ways can Ben raise the additional GHS 200,000.00 to enable him start his supermarket?

   .....
   .....
   .....
   .....

2. What name will you give to the initial GHS 100,000.00 in Ben' bank account?

   .....
   .....
   .....

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3. What collective term can you give to all the properties that Ben has to buy before he can start the supermarket?

.....
.....
.....

Activity 2: The accounting equation and the effects of transactions on the equation

Instruction

Use the information below and provide answers to the questions that follows:

If the accounting equation is stated as Assets = Capital + Liabilities, Assets = Capital or Assets = Liabilities, and the value of capital = GHS7000 and Assets = GHS 12000.

1. Write the various forms in which the accounting equation could be restated.
   .....
   .....
   .....
2. Find the value of the Liabilities
   .....
   .....
   .....
3. Assuming there is no liabilities, what will be the value of the capital?
   .....
   .....
   .....

Activity 3: Classifications of Assets and Liabilities

Instruction

You are provided with information relating to the state of affairs of a business as at 31st December 2017. Use the data provided to answer the questions that follows:

Assets and Liabilities	Value (GHS)
Buildings	42,000
Cash in hand	5,200
Prepaid expenses	11,000
Accrued expenses	4,500
Motor vehicles	23,750
Trade receivables	4,950
Loan	5,700
Trade payables	2,450
Fixtures	5,500
Inventory	8,800
Bank	1,250

You are required to calculate:

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1. The total value of non-current assets
   .....
   .....
   .....
   .....
2. The total value of current assets
   .....
   .....
   .....
3. The value of current liabilities
   .....
   .....
   .....
4. The capital of the business as at 31st December 2017
   .....
   .....
   .....

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ACCOUNTING (SHS 1)

THE ACCOUNTING EQUATION

Assignment Sheet

1. In your own words, distinguish between asset, liability and capital.
2. List Six (6) Non-Current assets that you can find in your house.
3. Ama Boadi, a sole proprietor commenced her business on 1st June 2015. She took a loan of GHS 2000.00 from GCB and she was able to acquire the following items:

Items	GHS
Shop	500.00
Stock	700.00
Furniture	200.00
Computer	700.00
Printer	800.00

What was Ama Boadi's capital at the beginning of her business?

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APPENDIX A2

Intervention 2 (Second Exemplary Material)

Subject	Accounting	Class/Form	SHS 1
Topic	Final Accounts of a Sole Proprietorship	Duration	120 mins (2 periods)
Overview of lesson: In this lesson, the following support materials are developed for effective execution of the lesson. 1) PowerPoint presentation—which the teacher will use to introduce the topic and also present summaries of lesson activities; 2) Lesson plan; which shows a step by step organization of the lesson to be conducted; 3) Student activity sheet; and 4) Assignment sheet. The activity sheets are designed in line with the lesson objectives and aimed to promote student-centered and interactive approach to teaching.			
Instructional Objectives	By the end of the lesson, the student will be able to: 1. perform basic arithmetic calculations (addition, multiplication, subtraction and division) without the use of calculators 2. compute for net sales, net purchases, cost of goods available for sale, cost of sales and the gross profit 3. prepare income statements of a sole proprietorship		
Interactive learning Objectives	Through the use of audio-visuals presentations of how to use the Excel – Spreadsheet in teaching accounting, students will be able to: • explore the spreadsheet environment • manipulate accounting figures in the spreadsheet to see its effects		
Skills	Students will use analytical, critical and observation skills to explain the formulas involve in arriving at net sales, net purchases, cost of sales and gross profit		
Knowledge	Students will learn how to: ▪ perform the arithmetic calculations without the use of calculator ▪ present financial statements in spreadsheet		
Attitude	▪ critical thinking and active participation		

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	introduce the topic for the lesson as "Final Accounts of a Sole Proprietorship" and writes it on the board. • By use of PowerPoint presentation, the teacher: - shares the lesson objectives with the students.	• Students listen to the teacher and write the lesson objectives in their books.
Lesson Development *(new knowledge, reinforcements, and reflections)* (80 minutes)	*Activity 1: Formats of Trading, profit and loss accounts (T, P & L) (20 minutes)* Through PowerPoint presentation, • Teacher shows students different images of trading, profit & loss accounts templates in excel spread sheet. • Teacher demonstrates to students how to download trading, profit & loss templates from the internet. • Teacher pairs students and tasks them to download three different templates of (T, P & L) accounts and identify the major components of the format. • After *activity 1*, teacher explains various components of the trading, profit and loss accounts to students.	• Students watch different templates and also observe the procedures involved in downloading the templates from the internet. • Students apply their understandings from the teacher's demonstration to download different templates of trading, profit & loss

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		accounts from the internet on their computers and identify major components of the format. • Each pair shares their answers with the whole class • ***Some discussion points expected from students:***
	• Teacher plays a video to show students the purpose of preparing trading and profit or loss accounts and then summarizes the key concepts in the activity.	• Gross sales and Net sales • Sales returns • Opening inventory • Cost of sales • Goods available for sale • Gross profit • Net profit
	Activity 2: *Calculating for Cost of Sales and Gross profit/loss (20 minutes)* • Through discussion, teacher guides students to go through the steps involved in computing for the values of cost of sales and the gross profit/loss from a given data.	• Students listen and watch the video and write down the key points into their note books.

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	• Teacher put students into groups of three and tasks each group to calculate for the values of cost of sales and the gross profit/loss from a given data. • After *activity* 2, teacher asks each group to share their answers with the whole class • Teacher then summarizes the basic accounting principles and concepts in the activity.	• Students makes contributions to class discussions by expressing their opinions and views about some of the items in the format such as; purchases, sales, return outwards/inwards, goods available for sale and carriage inwards. • Students apply their knowledge gained from the lesson to solve the questions on activity sheet (see activity 2) • Students share their ideas by explaining their answers to the questions on the activity sheet under *activity 2* to their colleagues. • Students write down the key accounting

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		concepts in the activity as teacher summarizes for revision purposes.
	Activity 3 Trading, Profit and Loss Account *(40 minutes)*	
	• Teacher asks students to mention some of the incomes and expenses of their parents that they know	• Students make contributions to class discussion by mentioning some of the income and expenses of their parents that they know.
	• Through PowerPoint, teacher plays a video from YouTube to differentiate between incomes and expenses for students to watch and listen. Teacher explains to students the processes involve in determining either the net profit or loss of person or an organisation. • That is, Net Profit/Loss = Total Income – Total Expenses	• Students listen and watch the visuals of the differences between incomes and expenses and write key points from the presentation.
	• In groups of four, teacher then asks students to work on activity 3 whiles he goes round and monitor groups' activities and provides necessary assistance to groups accordingly.	• Students apply their knowledge gained from the lesson to solve the questions on activity sheet (under activity 3)

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	• After *activity 3*, teacher asks each group's leader to present their group's solution to the questions in activity 3 on the board and explain to the whole class the procedures involved in arriving at their answers. • Teacher then summarizes the steps involved in solving the problem in activity 3 by highlighting on the key accounting concepts and principles.	• Group leaders present their answers to questions under activity 3 on the board and share with their colleagues the steps involved in arriving at their answers. • Students write down the key accounting concepts in the activity as teacher summarizes for revision purpose and ask questions for more insights into the solution to the problem
Conclusion, Evaluation and Feedback (25 minutes)	Finally, teacher sums up the whole lesson by highlighting the key concepts discussed as follows: • Cost of sales = Opening stock + Cost of purchases – Closing stock • Gross Profit = Sales – Cost of sales • Net Profit = Gross profit + Other income – Operating expenses Teacher then ends the lesson by: • asking students questions based on the instructional objectives of the lesson • inviting questions from students	Students write key notes and then ask questi ons for more clarification where necessary. • Students provide feedback responses to teacher's questions and then take

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	• giving assignment sheets to students	assignment sheets to be solved as homework.



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ACCOUNTING (SHS 1)

FINAL ACCOUNTS OF A SOLE TRADER

Activity sheet

Introduction

In this activity sheet, you have been provided with three activities that is; activity 1, activity 2 and then, activity 3. These activities are designed in such a way that, after going through the activities, you will be equipped with the necessary skills and knowledge needed to prepare final accounts of any sole proprietor. Again, you will also be able to present income statements in excel spread sheet.

Note: all activities are to be done in groups.

Activity 1: Formats of trading, profit and loss accounts

1. Use your computer to download three (3) different trading, profit and loss accounts templates in excel spread sheet format.
2. List the major components of the (T, P & L) accounts format you have downloaded onto your computer.

   .....
   .....
   .....
   .....

3. What is the main purpose of preparing trading accounts?

   .....
   .....
   .....

Activity 2: Computation of cost of sales and gross profit/loss

Instruction

Use the information below to provide answers to the questions that follows:

The following balances relate to Kofi Kwakye and Sons Enterprise for the period to 31st December 2016.

	GHS
Purchases	25000
Sales	48000
Wage and Salaries	13800
Opening Stock	8500
Closing Stock	9400
Carriage inwards	1500
Returns inwards	550
Returns outwards	600
Motor expenses	1020
Repairs and maintenance	650
Electricity	1800
Postages	700
Stationery	200
Rent and rates	2500

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Discount allowed	1050

You are required to:

1. Calculate the value of the Cost of Sales
   .....
   .....
   .....
2. Calculate the value of the Cost of Goods Available for Sale (C.O.G.A.F.S)
   .....
   .....
   .....
3. Determine the gross profit or loss for the enterprise.
   .....
   .....
   .....

Activity 3: Trading, Profit and Loss Accounts

Below is a trial balance extracted from the books of Glory Enterprise as at 30 September 2015

List of account balances	Dr (GHC)	Cr (GHC)
Goodwill	10000	
Motor vehicles	47000	
Bad debts	4260	
Commission received		12850
Furniture	4500	
Premises	38000	
Drawings	5000	
Rent expense	6000	
Sales		195870
Capital		82665
Warehouse wages	11500	
Discount received		245
Discount allowed	200	
Trade payables		12840
Trade receivables	10620	
Carriage inwards	820	

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Bank	15000	
Returns outwards		805
Returns inwards	1410	
Cash in hand	2480	
Machinery	12500	
Office salaries	23760	
Inventory, Oct. 1, 2013	14500	
Postage expenses	565	
Office expense	2755	
Bank loan		20000
Rates and insurance	4505	
Light and heat	2768	
Purchases	85726	
General expenses	2406	
Carriage outwards	1000	
Interest received		7500
Treasury bills	25000	
	332775	**332775**

Additional Information
Inventory at 30th September 2014 amounted to GHC 15000.
Requirement
You are require to prepare the income statements for Glory Enterprise for the year ended 30th September 2014.

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ACCOUNTING (SHS 1)
THE FINAL ACCOUNTS OF A SOLE PROPRIETOR
Assignment Sheet

Agoloso Enterprise is a retail organisation. On 31st December 2017, the following trial balance was extracted from the ledger.

	Debit GH₵	Credit GH₵
Sales		427,000
Carriage Inwards	475	
Wages and salaries	37,510	
Carriage Outwards	830	
Purchases	302,600	
Rent and Rates	13,500	
Heat and light	5,000	
Inventory at 01/01/2014	15,400	
Drawings	24,600	
Equipment at cost	102,000	
Motor vehicle at cost	45,000	
Trade receivables	50,000	
Trade payables		42,000
Bank Overdraft		35,000
Cash	500	
Capital		122,900
Sundry Expenses	37,585	
	635000	**635,000**

Note: Inventory at 31st December was valued at GH₵ 36,480.

You are required to prepare the trading, profit/loss account for year ended 31st

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APPENDIX B

TPACK self-assessment results for pre-service accounting teachers

		PRE-PDT		POST- PDT	
Dimension	**Items**	**Means**	**Standard Deviation**	**Means**	**Standard Deviation**
TK (Technology Knowledge)	I know how to solve my own technical problems.	2.63	.74	4.13	.64
	I can embed videos in a PowerPoint presentation	2.88	.99	5.00	.00
	I can learn technology easily.	3.63	.74	4.88	.35
	I can download videos from YouTube	3.38	1.06	5.00	.00
	I can prepare PowerPoint presentations with images	3.38	.74	5.00	.00
	I know how to use spreadsheet-excel very well	2.63	.92	5.00	.00
		3.09	**.87**	**4.84**	**.50**
	I know how to assess student performance in a classroom.	1.75	.71	4.88	.35

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PK (Pedagogical Knowledge)	I can use teaching approaches that engage students in a lesson	3.75	.46	4.75	.46
	I can adapt my teaching based-upon what students do not understand.	3.75	.46	4.88	.35
	I can adapt my teaching style to different learners.	3.25	.71	5.00	.00
	I can assess student learning in multiple ways.	3.75	.71	5.00	.00
	I know teaching strategies that encourage students to work together	3.25	1.04	4.88	.79
	I know how to organize and maintain classroom management.	3.63	.74	4.88	.35
		3.30	**.69**	**4.90**	**.33**
CK (Content Knowledge)	I have sufficient knowledge about accounting.	3.63	.74	4.75	.46
	I have various ways and strategies of developing my understanding of accounting.	3.75	.71	4.75	.46
	I know about many applications of accounting concepts in real life.	3.38	.74	4.75	.46
	I have sufficient understanding of concepts and principles within accounting.	3.50	.76	4.63	.52

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	I have a curriculum knowledge about accounting	3.63	.74	4.75	.46
		3.58	**.74**	**4.73**	**.47**
PCK (Pedagogical Content Knowledge)	I know how to select interactive teaching approaches to guide students learning of accounting.	3.50	.76	4.75	.46
	I know the aims and objectives for accounting content.	3.38	.74	4.63	.52
	I know instructional strategies that are suitable for accounting concepts.	3.75	.25	4.50	.53
	I know how t to assess students' learning in accounting.	3.00	1.07	4.63	.52
		3.41	**.71**	**4.63**	**.51**
TCK (Technological	I know about audio-visuals (e.g. images, YouTube videos) that I can use for understanding accounting.	2.63	.92	5.00	.00
	I know about audio-visuals (e.g. images, YouTube videos) that I can use to enhance learning of accounting.	2.50	.74	5.00	.00
	I can link appropriate audio-visuals to the accounting content.	2.13	.99	4.75	.46

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Content Knowledge)	I can use spreadsheet-excel to enhance the learning of accounting	2.63	.52	4.75	.46
	I can perform accounting calculations with spreadsheet-excel	2.63	.74	4.75	.46
		2.50	**.78**	**4.85**	**.28**
TPK (Technology Pedagogical Knowledge)=	I can choose audio-visuals (e.g. images, YouTube videos) that enhance the teaching approaches for a lesson.	2.38	.92	4.75	.46
	I can choose audio-visuals (e.g. images, YouTube videos) that enhance students' learning for a lesson.	2.88	.99	4.88	.35
	I can use PowerPoint presentations to enhance teaching approaches for a lesson	3.00	.53	4.50	.53
	My teacher education program has caused me to think deeply about how audio-visuals could influence teaching approaches I use in my future classroom.	3.63	.52	4.88	1.79
	I can use PowerPoint presentations to enhance students' learning	3.63	.52	4.88	.35

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	I am thinking critically about how to use audio-visuals (e.g. images, YouTube videos) in my future classroom.	3.50	.76	5.00	.00
	I can adapt the use of the audio-visuals that I am learning about to different teaching activities.	3.75	.46	4.88	.35
	I can use audio-visuals resources to facilitate higher order thinking skills.	3.50	.53	4.50	.53
		3.28	**.65**	**4.78**	**.55**
	I can teach lessons that appropriately combine accounting, audio-visuals (e.g. images, YouTube videos) and teaching approaches.	2.50	.76	4.75	.46
	I can select audio-visuals (e.g. images, YouTube videos) to use in my classroom that enhance what I teach, how I teach and what student learn.	2.63	.74	4.25	1.67
	I can use strategies that combine accounting, audio-visual (e.g. images, YouTube videos) s and teaching approaches that I learned in my coursework/programme.	2.75	.46	4.75	.46

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TPACK (Technology Pedagogy and Content Knowledge)	I can provide leadership in helping others to use teaching approaches that combine audio-visuals (e.g. images, YouTube videos) in teaching accounting.	3.13	.64	5.00	.00
	I can select teaching strategies for teaching accounting lessons through the use of PowerPoint	2.88	1.13	4.88	.35
	I can use PowerPoint presentations to enhance strategies for teaching accounting	3.00	.76	4.88	.35
	I can use appropriate teaching strategies to teach accounting with spreadsheet-excel	3.00	.76	4.75	.46
	I know teaching strategies that can be used to present accounting information in spreadsheet-excel format to enhance students' understanding of a lesson	3.13	.83	4.75	.46
		2.88	**.76**	**4.75**	**.53**

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APPENDIX C

Students perceived effectiveness of the in ICT-intervention

Dimensions	Statements	Mean	Standard Deviation
Active	The use of audio-visuals (images, YouTube videos, animations) in the lesson provided me with the opportunity to engage in the learning activities.	4.59	.85
	The lesson was participatory enough	4.49	.79
	The lesson included a wide range of activities that share the common element of involving students in the lesson	4.54	.60
		4.54	**.75**
Authentic	Through the use of audio-visuals (images, YouTube videos, animations), realistic problems were solved throughout the lesson	4.41	.72
	Through the use of audio-visuals, activities in the lesson were designed to mirrored real-world context	4.15	1.06
	The lesson experiences helped me to develop problem-solving skills	4.08	1.01
	Learning environment prepares me for the real-life situations.	4.41	.64
		4.26	**.86**
Collaborative	I understood some accounting concepts through interacting with my peers in the lesson	4.41	.79
	I see my peers as resources rather than competitors in class	4.39	.94
	I understood better in the questions we solved together as a group.	4.42	.92

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	Teacher employed strategies that motivated me to work together in solving questions	4.56	.68
	The lesson provided opportunities for me to interact with my peers throughout the lesson	4.44	.55
		4.44	**.78**
Intentional	Teacher clearly defines learning objectives to guide learning in the lesson	4.58	.55
	Teacher continually assesses our progress throughout the lesson	4.23	.99
	Teacher provides evaluative feedback to the class to guide learning	4.26	.97
		4.36	**.84**

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APPENDIX D

Some students' pre and post test scores for school A and school B

School A STUDENT	PRE-TEST SCORE	POST-TEST SCORE	School B STUDENT	PRE-TEST SCORE	POST-TEST SCORE
1	0	6	1	3	10
2	0	5	2	2	7
3	1	6	3	1	9
4	0	7	4	3	10
5	0	7	5	3	10
6	0	7	6	3	7
7	0	7	7	3	9
8	1	9	8	3	9
9	0	4	9	3	9
10	0	6	10	3	7

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APPENDIX E

Observation guide for the lesson taught by pre-service accounting teachers (PSATS)

Introduction

This instrument is designed to check for the effectiveness of the intervention in achieving interactive teaching with the use of audio-visuals. For the purpose of this study, technology refers to the use of audio-visuals such as images, YouTube videos, animations and the use of application soft wares such as PowerPoint presentations and Spreadsheet – excel in teaching accounting.

Effectiveness of the intervention	**Yes**	**No**	**Evidence from PSATS intervention (if yes)**
1. The lesson includes a wide range of activities that share the common element of involving students in the lesson			
2.Teacher uses audio-visuals (images, YouTube videos and PowerPoint presentations) to assist students to generate their own ideas based on known concepts in accounting			
3.The lesson provides students with the opportunity to think critically			
4. Through the use of audio-visuals (PowerPoint presentations, YouTube video, spreadsheet-excel) realistic problems were solved in the lesson.			
5. Activities in the lesson helped students to develop deeper understanding of concepts in accounting			
6. Teacher encourages students to solve problems together			
7. Students view one another as resources rather than competitors			
8. Teach encourages students to share information with their peers in the class.			

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9.Teacher asks follow-up questions in class discussions			
10. Students solve activities/questions in groups			
11. Through the use of audio-visuals (images, PowerPoint presentations, spreadsheet- excel) students share group's answers from activities with the whole class for discussion			
12. Teacher employs strategies that motivate students to work together			
13. Learning experiences in the lesson mirror the complexities of real life.			
14.The activities in the lesson encourage students develop problem-solving skills			
15. Learning environment prepares learners for the real-life situations			
16.The use of audio-visuals (images, Videos, PowerPoint presentations) in the lesson discourage students from memorization of accounting concepts and principles			
17. The use of audio-visuals in the lesson create learning environment that provides students with rich experiences			
18. The activities in the lesson promote meaningful learning in all domains			
19. Teacher acts purposefully, with a goal in mind			
20. Teacher clearly defines learning objectives for students to guide their learning			
21.Teacher employs instructional strategies that are likely to help students to achieve the objectives for the lesson			
22. Teacher continually assesses students' progress throughout the lesson			
23.Teacher understands how students learn			
24. Through the use of audio-visuals, the teacher prepares activities that are connected to students' interest			

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25. Teacher provides evaluative feedback to students			
26. Teacher monitors students learning in the lesson			

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APPENDIX F

Pre-service accounting teachers' questionnaire (TPACK self-assessment instrument)

Introduction

Dear student,

This questionnaire is designed to collect information about your knowledge and skills on integrating audio-visuals in teaching accounting. For the purpose of this questionnaire, technology refers to the use of audio-visuals such as images, YouTube videos, animations and the use of application soft wares such as PowerPoint presentations and Spreadsheet - excel. The information provided in this questionnaire will be used for reference only. All information will be treated with high confidentiality anonymity.

Technology integration Knowledge and skills

Please indicate by circling whether you: Strongly Disagree (SD) = 1, Disagree (D) = 2, Not Sure (NS) = 3, Agree (A) = 4 and Strongly Agree (SA) = 5 to each of the following statements. In areas where you are uncertain or neutral about your response, you may always circle "Not Sure"

		SD	D	NS	A	SA
	TK (Technology Knowledge)					
1	I know how to solve my own technical problems.	1	2	3	4	5
2	I can embed videos in a PowerPoint presentation	1	2	3	4	5
3	I can learn technology easily.	1	2	3	4	5
4	I can download videos from YouTube	1	2	3	4	5
5	I can prepare PowerPoint presentations with images	1	2	3	4	5
6	I know how to use spreadsheet-excel very well	1	2	3	4	5
7	I can hyperlink a video from the internet in a presentation	1	2	3	4	5

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	PK (Pedagogical Knowledge)					
8	I know how to assess student performance in a classroom.	1	2	3	4	5
9	I can use teaching approaches that engage students in a lesson	1	2	3	4	5
10	I can adapt my teaching based-upon what students do not understand.	1	2	3	4	5
11	I can adapt my teaching style to different learners.	1	2	3	4	5
12	I can assess student learning in multiple ways.	1	2	3	4	5
13	I know teaching strategies that encourage students to work together	1	2	3	4	5
14	I know how to organize and maintain classroom management.	1	2	3	4	5
	CK (Content Knowledge)					
15	I have sufficient knowledge about accounting.	1	2	3	4	5
16	I have various ways and strategies of developing my understanding of accounting.	1	2	3	4	5
17	I know about many applications of accounting concepts in real life.	1	2	3	4	5
18	I have sufficient understanding of concepts and principles within accounting.	1	2	3	4	5
19	I have a curriculum knowledge about accounting	1	2	3	4	5
	PCK (Pedagogical Content Knowledge)					
20	I know how to select interactive teaching approaches to guide students learning of accounting.	1	2	3	4	5
21	I know the aims and objectives for accounting content.	1	2	3	4	5

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	PK (Pedagogical Knowledge)					
8	I know how to assess student performance in a classroom.	1	2	3	4	5
9	I can use teaching approaches that engage students in a lesson	1	2	3	4	5
10	I can adapt my teaching based-upon what students do not understand.	1	2	3	4	5
11	I can adapt my teaching style to different learners.	1	2	3	4	5
12	I can assess student learning in multiple ways.	1	2	3	4	5
13	I know teaching strategies that encourage students to work together	1	2	3	4	5
14	I know how to organize and maintain classroom management.	1	2	3	4	5
	CK (Content Knowledge)					
15	I have sufficient knowledge about accounting.	1	2	3	4	5
16	I have various ways and strategies of developing my understanding of accounting.	1	2	3	4	5
17	I know about many applications of accounting concepts in real life.	1	2	3	4	5
18	I have sufficient understanding of concepts and principles within accounting.	1	2	3	4	5
19	I have a curriculum knowledge about accounting	1	2	3	4	5
	PCK (Pedagogical Content Knowledge)					
20	I know how to select interactive teaching approaches to guide students learning of accounting.	1	2	3	4	5
21	I know the aims and objectives for accounting content.	1	2	3	4	5

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22	I know instructional strategies that are suitable for accounting concepts.	1	2	3	4	5
23	I know how t to assess students' learning in accounting.	1	2	3	4	5
	TCK (Technological Content Knowledge)					
24	I know about audio-visuals (e.g. images, YouTube videos) that I can use for understanding accounting.	1	2	3	4	5
25	I know about audio-visuals (e.g. images, YouTube videos) that I can use to enhance learning of accounting.	1	2	3	4	5
26	I can link appropriate audio-visuals to the accounting content.	1	2	3	4	5
27	I can use spreadsheet-excel to enhance the learning of accounting	1	2	3	4	5
28	I can perform accounting calculations with spreadsheet-excel	1	2	3	4	5
	TPK (Technology Pedagogical Knowledge)					
29	I can choose audio-visuals (e.g. images, YouTube videos) that enhance the teaching approaches for a lesson.	1	2	3	4	5
30	I can choose audio-visuals (e.g. images, YouTube videos) that enhance students' learning for a lesson.	1	2	3	4	5
31	I can use PowerPoint presentations to enhance teaching approaches for a lesson	1	2	3	4	5
32	My teacher education program has caused me to think deeply about how audio-visuals could influence teaching approaches I use in my future classroom.	1	2	3	4	5
33	I can use PowerPoint presentations to enhance students' learning	1	2	3	4	5

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	I can embed images and videos in a PowerPoint presentation to enhance students' understanding of a lesson	1	2	3	4	5
34	I am thinking critically about how to use audio-visuals (e.g. images, YouTube videos) in my future classroom.	1	2	3	4	5
35	I can adapt the use of the audio-visuals that I am learning about to different teaching activities.	1	2	3	4	5
36	I can use audio-visuals resources to facilitate higher order thinking skills.	1	2	3	4	5
	TPACK (Technology Pedagogy and Content Knowledge)					
37	I can teach lessons that appropriately combine accounting, audio-visuals (e.g. images, YouTube videos) and teaching approaches.	1	2	3	4	5
38	I can select audio-visuals (e.g. images, YouTube videos) to use in my classroom that enhance what I teach, how I teach and what student learn.	1	2	3	4	5
39	I can use strategies that combine accounting, audio-visual (e.g. images, YouTube videos) s and teaching approaches that I learned in my coursework/programme.	1	2	3	4	5
40	I can provide leadership in helping others to use teaching approaches that combine audio-visuals (e.g. images, YouTube videos) in teaching accounting.	1	2	3	4	5
41	I can select teaching strategies for teaching accounting lessons through the use of PowerPoint	1	2	3	4	5
42	I can use PowerPoint presentations to enhance strategies for teaching accounting	1	2	3	4	5
43	I can use appropriate teaching strategies to teach accounting with spreadsheet-excel	1	2	3	4	5

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44	I know teaching strategies that can be used to present accounting information in spreadsheet-excel format to enhance students' understanding of a lesson	1	2	3	4	5

Adapted from Schmidt, Baran, Thompson, Mishra, Koehler & Shin (2009).

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APPENDIX G

Semi-structured interview protocol (adapted from Agyei (2012)

A: Background information

1. Gender _____

2. Topic taught: _____

Planning and Preparation of Lesson

1. What encouraged you to select this topic or concept for integration of audio-visuals?
2. Where did you obtained the audio-visuals used in the lesson?
3. How did the integration of audio-visuals affect your preparation for the lesson?
4. How did the initial training workshop influence your preparation to teach this content with audio-visuals?

During the lesson

5. Do you think the learners like the approach? Why or why not?
6. What aspects of your teaching of the accounting topic with audio-visuals went well and supported student learning? Please explain.
7. What aspects of your teaching with audio-visuals needed improvement?
8. How comfortable are you with using audio-visuals in teaching accounting?
9. What unexpected events happened when teaching this lesson with audio-visuals?
10. What were the difficulties in guiding learners to learn accounting concepts with audio-visuals in the lesson?
11. What role did you play in the teaching and learning process with the audio-visuals? A facilitator or an impart of information?
12. Describe the learners' attention in this lesson? Were they engaged? Did they act differently than in regular lessons?
13. Describe how you engaged the learners using the audio-visuals in teaching accounting.
14. What did the students say about learning with audio-visuals in accounting lesson?

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Lesson Activities

15. Was the activity sheet useful? Why and why not? Please explain.
16. How will you describe the lesson activities? Learner-centred or teacher-centred? Please explain.
17. Which of the four dimensions (active, collaborative, authentic and intentional) for interactive teaching with audio-visuals do you think your lesson activities projected the most? Why and how?
18. In what way did the lesson activities encourage learners to collaboratively construct their understanding of the concept taught?
19. What elements in your lesson activities do you think promoted interactivity in the accounting class?

Post – review of teaching

20. Was the integration of the audio-visuals helpful in teaching the accounting in an interactive manner in this lesson? Please explain.
21. After teaching this lesson, what preparation do you think you need to do for another lesson that integrates audio-visuals as tools for interactive teaching and learning?
22. Will you teach other accounting concepts using audio-visuals? If so, which concept? If not so why not?
23. With the amount of accounting content to be taught in the SHS each year, how often do you think it is feasible for you to incorporate spreadsheets (excel) in your lessons?
24. Do you think that more technology-oriented professional development programmes are needed to improve your teaching of accounting with audio-visuals?
25. What general comment can you make about using audio-visuals in the SHS accounting class?

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APPENDIX H

Sample questions for focus group discussions

1. How will you assess today's lesson; was it a success or failure?
2. Were the audio-visuals (e.g. images, YouTube videos) supported lessons appropriate for the accounting topics selected for the lessons?
3. To what extent did the audio-visuals (e.g. images, YouTube videos) supported lessons promote interactivity during the lessons?
4. What weaknesses do you perceive in the audio-visual supported lessons you witnessed?
5. What strengths in the audio-visual supported lessons do you think should be maximized for effective teaching of accounting?
6. What can be done to improve the audio-visuals supported lessons?

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APPENDIX I

Questionnaire for SHS accounting students (Effectiveness of intervention)

Dear Respondent,
I am conducting a research study and would like to ask for your help. If you are willing to participate, it should take about 5-10 minutes of your time. I am asking you to complete a questionnaire which seeks to measure the effectiveness of the audio-visual intervention for teaching accounting. For the purpose of this questionnaire, technology refers to the use of audio-visuals such as images, YouTube videos, animations and the use of application soft wares such as PowerPoint presentations and Spreadsheet - excel. The questionnaire is divided into two parts. The first part seeks to obtain your background information and the second part is a list of statements for which you are required to indicate whether you agree or disagree by circling in the appropriate box. Your participation is totally voluntary and that you may withdraw from this study at any time without penalty. Further, your name will not appear on any results and that my information will always remain confidential. Thank you for taking time to complete this task.

Demographic instrument

Part I: Background Information

1. Gender: Male { } Female { }

2. Age: Between 16-20 { } Between 21-25 { }

Other (please, specify): .....

3. Form: SHS1 { } SHS 2 { } SHS 3 { }

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Read the following statements carefully and indicate whether you agree or disagree by circling in the appropriate box. **Note: Strongly Disagree (SD) = 1, Disagree (D) = 2, Not Sure (NS) = 3, Agree (A) = 4, Strongly Agree (SA) = 5**

Statements	SD	D	NS	A	SA
1. The use of audio-visuals (images, YouTube videos, animations) in the lesson provided me with the opportunity to engage in the learning activities.	1	2	3	4	5
2.The lesson was participatory enough	1	2	3	4	5
3.The lesson provided opportunities for me to interact with my peers throughout the lesson	1	2	3	4	5
4. Through the use of audio-visuals (images, YouTube videos, animations), realistic problems were solved throughout the lesson	1	2	3	4	5
5.The lesson included a wide range of activities that share the common element of involving students in the lesson	1	2	3	4	5
6.The teacher's role in the lesson was more student-centred	1	2	3	4	5
7.The lesson provided opportunities for me to solve problems together with my peers in classroom	1	2	3	4	5
8. I understood some accounting concepts through interacting with my peers in the lesson	1	2	3	4	5
9.I see my peers as resources rather than competitors in class	1	2	3	4	5
10. I understood better in the questions we solved together as a group.	1	2	3	4	5
11.Teacher employed strategies that motivated me to work together in solving questions	1	2	3	4	5
12. Through the use of audio-visuals, activities in the lesson were designed to mirrored real-world context	1	2	3	4	5

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13.The lesson experiences helped me to develop problem-solving skills	1	2	3	4	5
14. Learning environment prepares me for the real-life situations.	1	2	3	4	5
15.Teacher clearly defines learning objectives to guide learning in the lesson	1	2	3	4	5
16.Teacher continually assesses our progress throughout the lesson	1	2	3	4	5
17.Teacher provides evaluative feedback to the class to guide learning	1	2	3	4	5

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APPENDIX J

Experiences with the intervention questionnaire for SHS accounting students

Dear Respondent,
I am conducting a research study and would like to ask for your help. If you are willing to participate, it should take about 5-10 minutes of your time. I am asking you to complete a questionnaire which seeks to measure your experiences with the audio-visual intervention for teaching accounting. For the purpose of this questionnaire, technology refers to the use of audio-visuals such as images, YouTube videos, animations and the use of application soft wares such as PowerPoint presentations and Spreadsheet - excel. The questionnaire is divided into two parts. The first part seeks to obtain your background information and the second part is a list of statements for which you are required to indicate whether you agree or disagree by circling in the appropriate box. Your participation is totally voluntary and that you may withdraw from this study at any time without penalty. Further, your name will not appear on any results and that my information will always remain confidential. Thank you for taking time to complete this task.

Demographic instrument

Part I: Background Information

1. Gender: Male { } Female { }

2. Age: Between 16-20 { } Between 21-25 { }

Other (please, specify): .....

4. Form: SHS1 { } SHS 2 { } SHS 3 { }

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Read the following statements carefully and indicate whether you agree or disagree by circling in the appropriate box. **Note: Strongly Disagree (SD) = 1, Disagree (D) = 2, Not Sure (NS) = 3, Agree (A) = 4, Strongly Agree (SA) = 5,**

Experiences with the intervention	SD	D	NS	A	SA
1. With the use of images, YouTube videos, animations and the use of PowerPoint presentations and Spreadsheet – excel in the lesson, I now need little assistance in learning accounting	1	2	3	4	5
2.The use of group work in the lesson has enhanced my participation in class activities	1	2	3	4	5
3.The activities in the lesson motivate me to work in teams	1	2	3	4	5
4. The use of images and videos for demonstrations in the lesson has improved my critical thinking skills	1	2	3	4	5
5.The use of videos and images for demonstrations in the lesson has improved my knowledge retention	1	2	3	4	5
6. Learning with videos, images and spreadsheet-excel has enabled me to become independent in classroom	1	2	3	4	5
7.The use videos, images and spreadsheet-excel in the lesson has increased my passion to learn accounting	1	2	3	4	5
8.The activities in lesson made the teaching and learning process interactive	1	2	3	4	5
9. The use of videos and images in the lesson generally made the lesson interesting	1	2	3	4	5
10. With the use of videos and images in the lesson, I understood concepts that I found difficulty to understand before	1	2	3	4	5

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11. The activities in the lesson helped me to understand the lesson better	1	2	3	4	5
12.The use of the worksheet made the lesson interesting	1	2	3	4	5
13. I can relate the concepts in the lesson to real life application	1	2	3	4	5
14. The content of the lesson was clear	1	2	3	4	5
15. The content of the lesson was well delivered	1	2	3	4	5
16. The delivery of the lesson was well supported by examples	1	2	3	4	5
17. The examples given enhanced my understanding of the lesson	1	2	3	4	5
18. The team work helped me to understand better	1	2	3	4	5
19. I found the lesson exciting	1	2	3	4	5
20. There was clarification of some difficult concepts	1	2	3	4	5
21. Due to clarity I can do my assignment with ease	1	2	3	4	5
22. Discussion in the groups helped me to learn better	1	2	3	4	5
23. The use of the power point presentation motivated my learning	1	2	3	4	5
24. Group presentations with videos and images were exciting	1	2	3	4	5

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APPENDIX K

ETHICAL CLEARANCE

UNIVERSITY OF CAPE COAST

INSTITUTIONAL REVIEW BOARD SECRETARIAT

TEL: 03321-33172 3/0207358653/0244207814 C/O Directorate of Research, Innovation and Consultancy
E-MAIL: irb@ucc.edu.gh
OUR REF: UCCIRB/A/2016/523
YOUR REF:
OMB NO: 0990-0279
IORG #: IORG0009096

11TH JULY, 2019

Mr. Bernard Fentim Darkwa
Department of Business and Social Sciences Education
University of Cape Coast

Dear Mr. Darkwa,

ETHICAL CLEARANCE –ID: (UCCIRB/CES/2019/19)

The University of Cape Coast Institutional Review Board (UCCIRB) has granted **Provisional Approval** for the implementation of your research protocol titled **Improving pre-service teachers' pedagogical strategies for integrating ICT in teaching Accounting in Senior High Schools**. This approval requires that you submit periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

Please note that any modification of the project must be submitted to the UCCIRB for review and approval before its implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

Samuel Asiedu Owusu, PhD
UCCIRB Administrator

ADMINISTRATOR
INSTITUTIONAL REVIEW BOARD
UNIVERSITY OF CAPE COAST

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APPENDIX L

Informed consent

Title: **Improving pre-service teachers' pedagogical strategies for integrating ICT in teaching accounting in senior high schools**

Principal Investigator: Bernard Fentim Darkwa

Address: Department of Business and Social Sciences Education, University of Cape Coast, Ghana.

General Information about Research

The study generally seeks to explore how pre-service accounting teachers can improve on their pedagogical strategies for integrating ICT (use of audio-visual materials) to enhance the teaching of accounting to make it more interactive. Accordingly, I will like to gather data from you where your class will be observed and also you will be interviewed (which will be recorded). All data collected from you will be kept in a coded form (that is, confidentiality and anonymity will be ensured, you will not be required to write your name, phone numbers or anything that might link you to the completed form.)

The data may be kept indefinitely for possible tracheal study analysis and that I have no plans to completely destroy that data set. I may reproduce your written statements in my thesis and for other publications relating to this research. You will not be identified in any way in these reproductions. Your participation is totally voluntary and that you may withdraw from this study at any time without penalty. Further, your name will not appear on any results and that my information will always remain confidential. Completion of the interview

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sessions will take approximately 30 minutes and the observation will last the whole instructional session. There is a minimal level of risk (that is, moving from campus to the SHS with a car) and modest personal benefit (that is, you will be equipped with the skill to teach accounting with ICT during your off-campus teaching practice) involved with participation in this study. No compensation will be given to you for your participation in the study. You can voluntarily remove yourself from the study without penalty.

You may withdraw this consent at any time without prejudice or penalty. You have the right to ask and have questions answered concerning the study and that these questions, if any, have been answered to your satisfaction. You may contact me on 0243461864 or through bernard.darkwa@ucc.edu.gh. If you have questions about your rights as a participant in this research, or you feel you have been placed at risk, you can contact my supervisor, Prof. Douglas D. Agyei (Phone: 0244711380) and Dr Joseph Tufuor Kwarteng (Phone: 0543789342) for answers to any and all questions about this research. Results will be sent to you upon request.

Your rights as a Participant

This research has been reviewed and approved by the Institutional Review Board of University of Cape Coast (UCCIRB). If you have any questions about your rights as a research participant you can contact the Administrator at the IRB Office between the hours of 8:00 am and 4:30 p.m. through the phones lines 0558093143/0508878309/0244207814 or email address: irb@ucc.edu.gh.

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VOLUNTEER AGREEMENT

The above document describing the benefits, risks and procedures for the research title **Improving pre-service teachers' pedagogical strategies for integrating ICT in teaching accounting in senior high schools** has been read and explained to me. I have been given an opportunity to have any questions about the research answered to my satisfaction. I agree/do not agree to participate as a volunteer.

_____ _____

Date Name and signature or mark of volunteer

If volunteers cannot read the form themselves, a witness must sign here:

I was present while the benefits, risks and procedures were read to the volunteer. All questions were

answered and the volunteer has agreed to take part in the research.

_____ _____

Date Name and signature of witness

I certify that nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

_____ _____

Date Name Signature of Person Who Obtained Consent

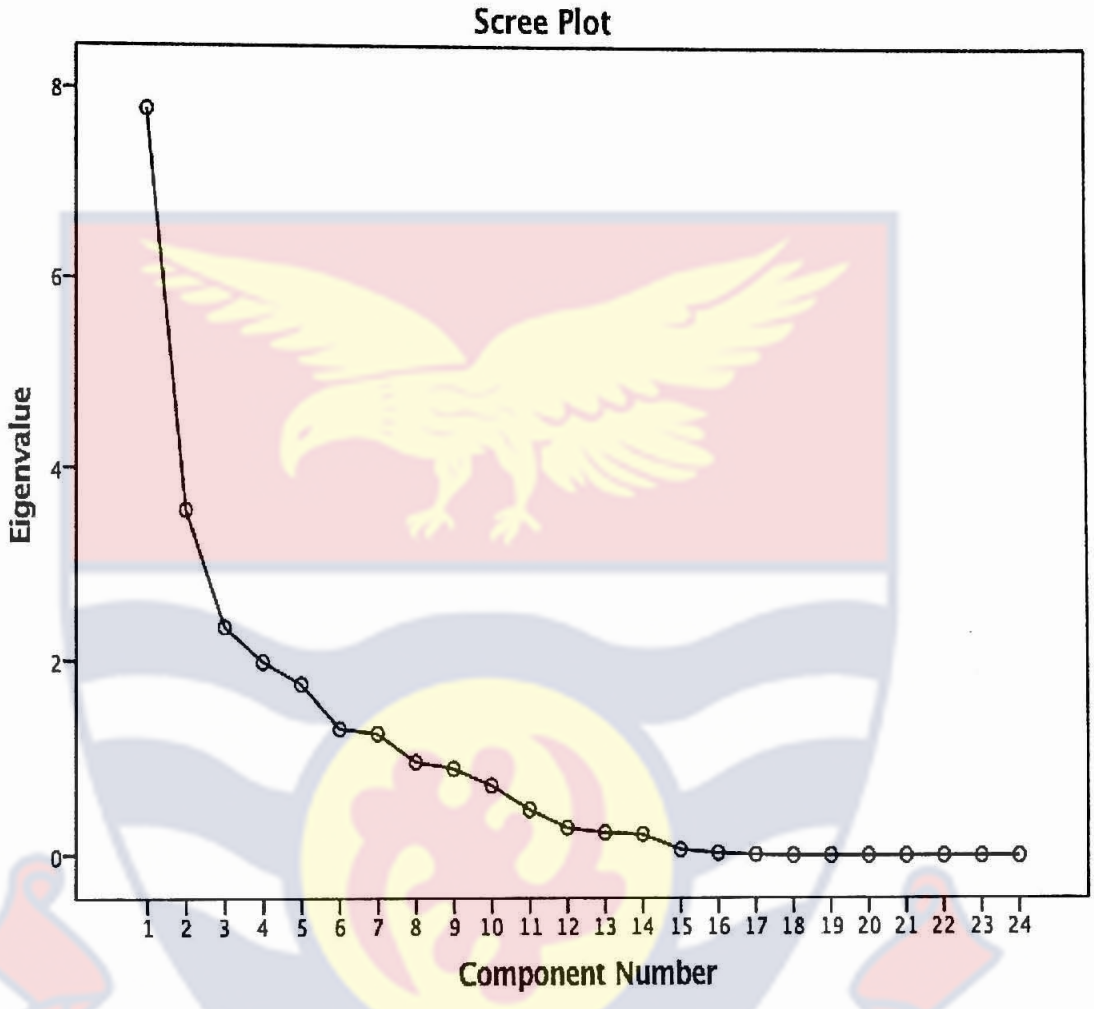
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APPENDIX M

Factor Analysis for School A



S/N	Factor	Items	Factor Loadings
	Delivery	With the use of images, YouTube videos, animations and the use of PowerPoint presentations and Spreadsheet – excel in the lesson, I now need little assistance in learning	.53
		The use of group work in the lesson has enhanced my participation in class activities	.86
		The activities in the lesson motivate me to work in teams	.91

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		The use of images and videos for demonstrations in the lesson has improved my critical thinking skills	.56
		The use of videos, images and spreadsheet-excel in the lesson has increase my passion to learn accounting	.82
		The activities in the lesson made the teaching and learning process interactive	.66
		I can relate the concepts in the lesson to real life application	.54
		The content of the lesson was clear	.79
		The content of the lesson was well delivered	.74
		I found the lesson exciting	.75
		There was clarification of some difficult concepts	.93
		Due to Clarity, I can do my assignment with ease	.82
		Group presentation with videos and images were exciting	.71
	Comprehension	Learning with videos, images and spreadsheet-excel has enabled me to become independent in classroom	.51
		The use of videos and images in the lesson generally made the lesson interesting	.53
		The use of the worksheet made the lesson interesting	.68
		The delivery of the lesson was supported by examples	.61

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		The team work helped me to understand better	.61
		Discussion in the groups helped me to learn better	.62
	Interest	The use of videos and images for demonstrations in the lesson has improved my knowledge retention	.60
		The activities in the lesson helped me to understand the lesson better	.68
		The examples given enhanced my understanding of the lesson	.49

Descriptive Statistics

S/N	Factor	Items	Mean	SD
	Delivery	With the use of images, YouTube videos, animations and the use of PowerPoint presentations and Spreadsheet – excel in the lesson, I now need little assistance in learning	4.72	.46
		The use of group work in the lesson has enhanced my participation in class activities	4.56	.62
		The activities in the lesson motivate me to work in teams	4.67	.59
		The use of images and videos for demonstrations in the lesson has improved my critical thinking skills	4.56	.86

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		The use of videos, images and spreadsheet-excel in the lesson has increase my passion to learn accounting	4.67	.97
		The activities in the lesson made the teaching and learning process interactive	4.83	.38
		I can relate the concepts in the lesson to real life application	4.61	.50
		The content of the lesson was clear	4.83	.51
		The content of the lesson was well delivered	4.44	.62
		I found the lesson exciting	4.33	1.33
		There was clarification of some difficult concepts	4.22	1.00
		Due to Clarity, I can do my assignment with ease	4.39	.98
		Group presentation with videos and images were exciting	4.78	.43
	Comprehension	Learning with videos, images and spreadsheet-excel has enabled me to become independent in classroom	3.72	1.32
		The use of videos and images in the lesson generally made the lesson interesting	4.56	.78
		The use of the worksheet made the lesson interesting	4.67	.77
		The delivery of the lesson was supported by examples	4.78	.43
		The team work helped me to understand better	4.72	.46

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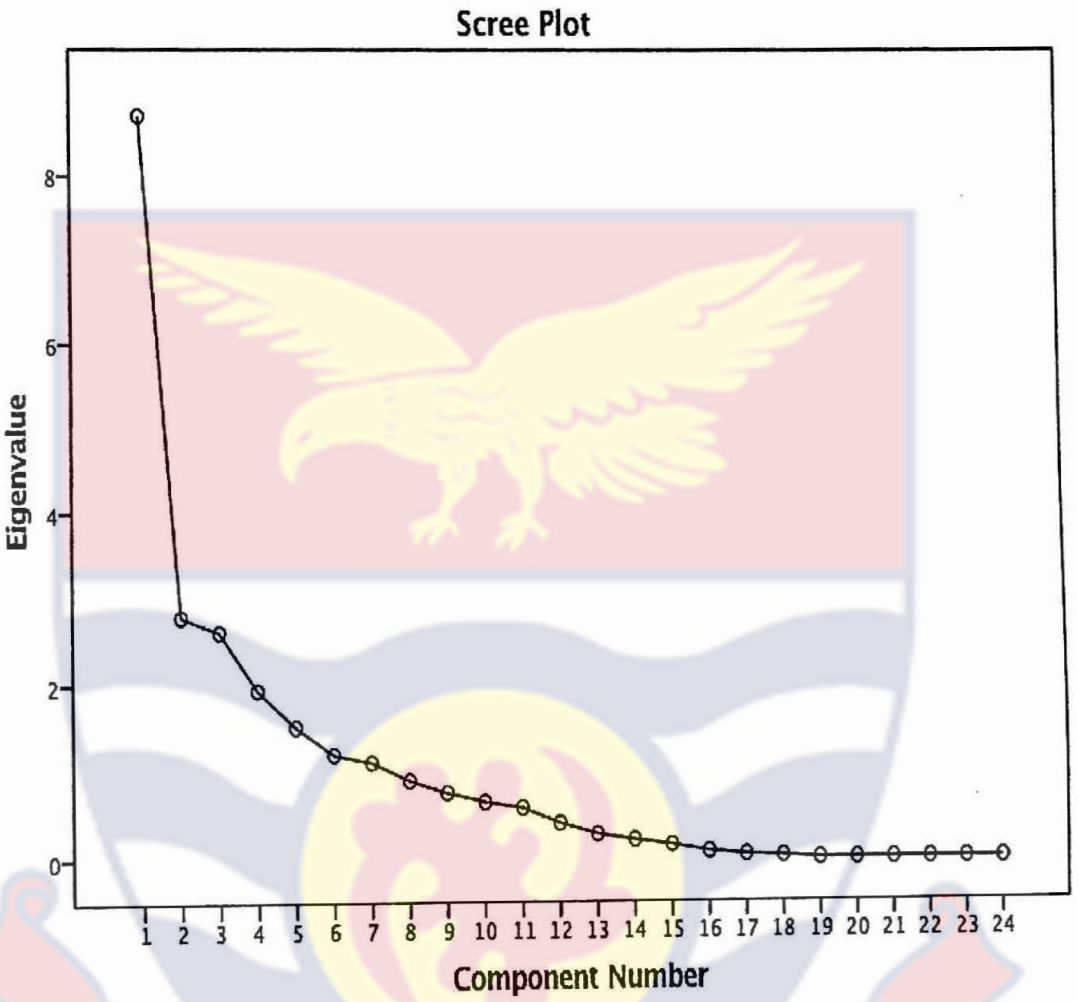
		Discussion in the groups helped me to learn better	4.50	.99
	Interest	The use of videos and images for demonstrations in the lesson has improved my knowledge retention	4.72	.46
		The activities in the lesson helped me to understand the lesson better	4.94	.24
		The examples given enhanced my understanding of the lesson	4.78	.43

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APPENDIX N

Factor Analysis for School B



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Factor Loadings

S/N	Factor	Items	Factor Loadings
	Delivery	With the use of images, YouTube videos, animations and the use of PowerPoint presentations and Spreadsheet – excel in the lesson, I now need little assistance in learning	.61
		The use of group work in the lesson has enhanced my participation in class activities	.82
		The use of images and videos for demonstrations in the lesson has improved my critical thinking skills	.78
		The use of videos and images for demonstrations in the lesson has improved my knowledge retention	.59
		The use of videos, images and spreadsheet-excel in the lesson has increase my passion to learn accounting	.72
		The use of videos and images in the lesson generally made the lesson interesting	.69
		With the use of videos and images in the lesson, I understood concepts that I found difficult to understand before	.72
		The activities in the lesson helped me to understand the lesson better	.74
		The use of the worksheet made the lesson interesting	.78
		The content of the lesson was clear	.63
		The content of the lesson was well delivered	.65

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		The team work helped me to understand better	.66
		Due to Clarity, I can do my assignment with ease	.82
		Group presentation with videos and images were exciting	.83
	Understanding	The activities in the lesson motivate me to work in teams	.61
		The delivery of the lesson was supported by examples	.55
		There was clarification of some difficult concepts	.55
		Discussion in the groups helped me to learn better	.55
	Interest	Learning with videos, images and spreadsheet-excel has enabled me to become independent in classroom	.41
		The activities in the lesson made the teaching and learning process interactive	.53
		I can relate the concepts in the lesson to real life application	.62
		I found the lesson exciting	.56
		The use of the PowerPoint presentation motivated my learning	.93

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Descriptive Statistics

S/N	Factor	Items	Mean	SD
	Delivery	With the use of images, YouTube videos, animations and the use of PowerPoint presentations and Spreadsheet – excel in the lesson, I now need little assistance in learning	4.26	1.10
		The use of group work in the lesson has enhanced my participation in class activities	4.32	1.00
		The use of images and videos for demonstrations in the lesson has improved my critical thinking skills	4.37	.90
		The use of videos and images for demonstrations in the lesson has improved my knowledge retention	4.42	.69
		The use of videos, images and spreadsheet-excel in the lesson has increase my passion to learn accounting	4.42	.84
		The use of videos and images in the lesson generally made the lesson interesting	4.68	.58
		With the use of videos and images in the lesson, I understood concepts that I found difficult to understand before	4.42	.84
		The activities in the lesson helped me to understand the lesson better	4.37	.60
		The use of the worksheet made the lesson interesting	4.11	1.29
		The content of the lesson was clear	4.21	.63

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		The content of the lesson was well delivered	4.32	.58
		The team work helped me to understand better	4.37	.83
		Due to Clarity, I can do my assignment with ease	3.89	.99
		Group presentation with videos and images were exciting	4.58	.96
	Understanding	The activities in the lesson motivate me to work in teams	4.42	.51
		The delivery of the lesson was supported by examples	4.21	1.18
		There was clarification of some difficult concepts	4.11	.99
		Discussion in the groups helped me to learn better	3.95	1.13
	Interest	Learning with videos, images and spreadsheet-excel has enabled me to become independent in classroom	4.26	.16
		The activities in the lesson made the teaching and learning process interactive	4.32	1.06
		I can relate the concepts in the lesson to real life application	3.79	1.27
		I found the lesson exciting	4.47	.51
		The use of the PowerPoint presentation motivated my learning	4.84	.70

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APPENDIX O

Pre-Services Teachers Interview Responses

Group 1 Teacher 1

Planning and Preparation of Lesson

1. More understanding for students
2. Youtube and Google
3. It makes learning preparation short
4. Embedment of document and hyperlinking and downloading videos from youtube.

During the Lesson

5. Because it was a new approach, they liked it
6. The use of images communicated a lot
7. The videos should be slowed. It was too fast
8. Very comfortable because of the training
9. The students concentrated on the images while teaching was ongoing and the sound of the video was low
10. I think if the projector is not covered, the students were watching the images whilst I was explaining some concepts
11. Facilitator
12. They were engaged
13. They watched videos to brainstorms ideas
14. The videos and the images helped them to render everything

Lesson Activities

15. It was very useful because it saves time
16. Teacher centered

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17. Collaboration because of group work
18. Sharing of ideas and learning from each other
19. The first activity sheets (case study) by students

Post-review of teaching

20. It is very helpful. This is because over the years teaching has been taught abstractly. I didn't even know we have excel of trading profit and loss account
21. I have wok on how to connect what I teach in class in the outside world
22. Yes. For example, manufacturing, trading account of a sole trader
23. It is feasible if school have computer
24. Yes, technology is everywhere so teacher need the training
25. Audio-visual will help students to see and listen at the same time

Group 1 Teacher 2

Planning and Preparation of Lesson

1. The topic can be easily taught with the use of audio-visual and also students will comprehend the understanding of the topic well when the instruction is aided with audio-visuals
2. Youtube and Microsoft online images and videos
3. It makes lesson preparation more easy and less time is required to prepare for a lesson
4. Initially, hyperlinking a text to my PowerPoint presentation was problematic. After the training, hyperlinking a text became more easy and also make preparation of the intervention more easy

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During the Lesson

5. Yes, learning like the approach because the lesson was aided with audio-visuals
6. The use of excel to prepare the income statement. This synthesised or arouse students interest in the lesson delivery
7. The use of images and videos that will match the exact content of the topic
8. It has been my dream to use audio-visuals to instruct one day. This has made me very comfortable with the intervention
9. Students becomes interested in the lesson due to the new trend of teaching. Thus, the use of audio-visuals
10. Some students use the group discussion as an avenue to talk while concentrating or guiding other groups. It has been a challenge faced
11. Due to the use of audio-visuals in the teaching, it makes the instruction student centered hence, I was just guiding or facilitating the teaching-learning process
12. Student attention during the lesson was sumptuous. They really engaged. They acted differently as compared to other mode of teaching
13. Students were engaged with the use of group discussion and students own activities. Majority of the lesson activity was performed by the students
14. It makes learning interesting and makes the teaching of accounting easy

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Lesson Activities

15. The activity sheet was useful because it help student to share ideas and also measures or enhance students' progress in the lesson
16. Learner-centred since most of the activities were performed by the students
17. Active and collaborative. This is because, the lesson was student centred hence, students were active. Also, due to the sharing of ideas via grouping of students, it was more collaborative.
18. The lesson activities were perform in groups. This encourage students to share ideas hence, they were able to construct their own understanding through the knowledge shared.
19. The use of the audio-visuals or ICT in teaching accounting

Post-review of teaching

20. Yes, students exhibited grasp of the content knowledge
21. Learn how to use perfect audio-visuals that match a particular content
22. Yes, I think the concept in accounting can be taught using audio visuals
23. The use of spreadsheets (excel) in teaching accounting helps students to pay attention and enhance easy understanding of the concept. In view of this, excel should be use as often as possible
24. No
25. Using audio-visual to teach in Senior High Schools will improve or help improve on the academic performance of student

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Group 2 Teacher 1

Planning and Preparation of Lesson

1. It was simple
2. Images from pixabay and videos from youtube
3. It made the lesson easily to teach as it was not in abstract form
4. Previously, I didn't know how to download videos and embedded hyperlinks in presentation

During the lesson

5. Yes, from the way they participated in the lesson
6. Introduction of the topic. Explain VAT, they saw images of shops and receipts
7. Second video should have been trimmed
8. Very comfortable
9. The sound of the videos were low. Students couldn't hear the sound
10. It is easy to use audio-visual in guiding the learner to learn
11. Facilitator of the process
12. Participation was higher than the traditional settings
13. I didn't use audio-visuals to engage learners
14. They said it was a nice approach to teach accounting

Lesson Activities

15. They were useful. It made everyone to participate
16. Learner centred. It involves transfer of knowledge
17. Collaborative because most of the activities were done in groups
18. Discussion from groups and hearing from each other
19. Calculation of input and output VAT

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Post-review teaching

20. Yes, it was helpful because of the videos and images
21.
22. Yes, I will. All my subsequent teaching. For example, accounting for non-profit organization and company accounts
23. It is feasible
24. More professional development training is needed for ICT integration
25. More of the teaching should be done with the audio-visual to students understanding and retention

Group 2 Teacher 2

Planning and Preparation of Lesson

1. Being the first time of using audio-visual integration to teach, I thought VAT was simple topic and it happens in our daily activity
2. From the internet. Youtube to be precise
3. It made the preparation of my lesson very easy, simple to teach and helpful for my students to understand
4. It helped in bringing the world to a classroom by just showing visuals which was appropriate in a simple way. Getting teaching and learning resources easier and simple to execute

During the lesson

5. They liked my approach because they were very attractive when they saw visuals of whatever they were being taught
6. The introduction of the topic. How they go for shopping and they get receipt with VAT element on it
7. The video. It was quite fast and needed it to slow down

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8. Very comfortable. Just showing my students with pictures and videos to make them know everything in teaching them is on track
9. Using a phone as a remote control and suddenly it failed
10. Because I was reading or looking from the slides, some of the students were not paying attention and I didn't really see them
11. Both a facilitator and impart of information because I help them understand by facilitating and also I imparted a lot of information to them
12. They acted very differently. They were attentive and wanted to contribute after every video
13. By giving them videos to watch and pictures as well
14. It was interesting and it felt like watching a movie. They said they will always remember what was shown in the videos

Lesson Activities

15. It was useful. It helped to know the knowledge of students before the lesson and after the lesson
16. Learner centered. It was collaborative work as students shared their views.
17. Active, collaborative and intentional. The students were active in class, the collaborated with their peers and whatever I did was very intentional
18. When they shared ideas in the groups given to them
19. When questions were asked and answered by students

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Post-review of teaching

20. Yes, ideas from students were shared and questions were asked as well
21. My videos should have a moderate pace and not very fast
22. Depreciation, it will help the students get the concept well since most students find that topic to be difficult
23. Very often, provided the computer lab will be open for students to practice
24. Whatever has been taught from this workshop has been useful but I think there is more to be improved
25. It is very great. Students would understand concepts very well; they will understand and also remember what they are taught in class and practice it as well

Group 3 Teacher 1

Planning and Preparation of Lesson

1. This topic gives a clear gist and understanding of using audio-visuals. Though a little complex topic, the audio-visuals made it less complete
2. From the internet, particularly youtube downloads
3. It was less costly, efficient and enhanced me to prepare for the lesson quickly
4. It played a huge influence since prior to teaching with audio-visuals, I had a little or no knowledge on the integration of certain important components to enhance effective teaching and learning

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During the lesson

5. Yes, this is because they were much attentive, involving and participated much more in the lesson than when there was no incorporation of audio-visuals
6. The introductory part. This part ensured active students participation and sparked the whole lesson. It also ensured students interests and expectations
7. The conclusion and evaluation aspects. That is how to properly tests students understanding of the lesson with solely concentrated on audio visuals
8. Much more comfortable because it reduces the burden in lessons. Students grasps concepts much more easier
9. Unexpected and intermittent delays in playing of the videos and controlling certain aspects of the slide presentation
10. Linking how to depreciate their fixed assets at home. Knowing how long an asset may be estimated to be.
11. A facilitator
12. They were engaged, interactive and attentive. They involved themselves
13. To explain a phenomenon, I displayed pictures or videos to them around their interest to know what they think, take their ideas, and then explain authority to them
14. They were very happy, less stressed and enjoyed the lesson very much

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Lesson Activities

15. Yes, it engaged each students individually and in groups to discuss, share ideas and understand concepts
16. Learner-centred. This is because all what was discussed were solicited from students understanding and conception. The teacher was only a guide and facilitator
17. Collaborative. This is because, most activities undertaken were done in groups for students to interact and share ideas with each other
18.
19. The display of videos and pictures to students. Also, allowing students to work in groups ensured interactivity

Post-review of teaching

20. Yes, it explained concepts better and linked them to real life situations
21. Incorporate better ways of displaying videos and slides to ensure a reduction in intermittent delays.
22. Yes, concept in the accounting syllabus is worth teaching using audio-visuals. It does not ensure and reduces the complications in understanding concepts better
23. Often. At least in lessons and concepts which ensures easy understanding and grasping concepts faster
24. Yes, it makes teaching and learning effective and efficient
25. It is helpful and aids both teaching and learning, both during lessons and outside lessons. It exposes students to real world concepts and attracts their attentiveness during lessons.

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Group 4, Teacher 1

Planning and Preparation of Lesson

1. I felt it was easy to use audio-visuals
2. Youtube and google images
3. I spent more time on the preparation of the PowerPoint preparation and extra cost on downloading the videos
4. The training helped me to know how to download video and embed them into my presentation

During the lesson

5. I think the learners liked the approach to teaching. This is because the class was very interactive and collaborative and the use of audio-visual made the class interesting
6. The fixing of the videos and pictures in the lesson well and was very collaborative because learners were motivated to learn.
7. The need to link the various videos and pictures to the actual teaching to make it a real world learning experiences needs to be improved
8. Very comfortable because it makes the teaching activity very easier and teachers are able learn faster
9. The hyperlink activity because somehow complicated and the mouse from wider were sometimes very slow
10. Learner were paying more attention to the audio-visual more than the teachers delivery
11. I was only a facilitator making sure students understand very well the learning concepts

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12. Learners were very much engaged and acted very motivated and interested about the prospect of learning with the audio-visuals
13. Learners were asked to give feedback on what they think about the videos and pictures concerning the days topic
14. Students expressed enthusiasm and were motivated in the accounting class

Lesson Activities

15. It was very useful because it gave students the opportunity to share their opinions in writing before, during and after the lesson
16. The activity was learner centred because the use of audio-visuals allowed the teacher to act only as a facilitator with learners doing most activities
17. It was more collaborative and intentional. This is because learners were given very much involved and the lesson was linked to real world experiences
18. Learners were put in various groups to perform various activities and shared varied options
19. The use of the audio-visuals promoted interactive teaching and learning

Post-review of teaching

20. It was very interactive as learners shared opinions with their peers and the class
21. I need to ensure more activity based discussion and lessons for the learners

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22. I will teach depreciation with the use of audio-visuals because it will provide a real learning experience for them
23. More often to help students in their various calculations
24. Yes, this will equip me to make learning interesting for learners
25. Audio-visual are very helpful and important in the teaching of accounting to ensure a more collaborative, active and interesting class discussions

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Date: 30th April, 2019

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TO WHOM IT MAY CONCERN

Dear Sir/Madam,

INTRODUCTORY LETTER

Mr. Bernard Fentim Darkwa is a PhD Curriculum & Teaching student of this Department. As part of his education, he is supposed to design and execute research of acceptable standard. With this, he is working on the research topic: "Improving Pre-Service Teachers' Pedagogical Strategies for integrating ICT in teaching Accounting in SHS".

His study seeks to develop an intervention that will make the teaching of accounting in SHS in Ghana more interactive with the use of audio-visuals. He would, therefore, need data from pre-service accounting teachers in UCC and SHS accounting students.

In case he flouts any ethical requirement as the study may necessitate, kindly get in touch with his supervisors, Prof. Douglas D. Agyei, the Principal Supervisor, on 0244711380 or through e-mail ddagyei@ucc.edu.gh; or Dr. Joseph Tufuor Kwarteng, the Co- Supervisor, on 0243822873 or through e-mail jtkwarteng@ucc.edu.gh. You may also get in touch with the Department on 0209408788 or through dbsse@ucc.edu.gh.

We would be grateful if you could give him the necessary assistance to enable him complete the research.

Thank you.

Yours faithfully,

DR. JOSEPH TUFUOR KWARTENG
HEAD

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