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Faculty of Education

PEDAGOGICAL APPROACHES IN THE USE OF TECHNOLOGY FOR VISUAL ARTS IN GHANAIAN HIGH SCHOOLS

by

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Submitted in fulfilment of the requirements for the degree

PHILOSOPHIAE DOCTOR

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Supervisor: Dr Raïta Steyn

November 2022

DECLARATION

I declare that the dissertation/thesis, which I hereby submit for the degree Philosophiae Doctor at the University of Pretoria, is my work and has not previously been submitted by me for a degree at this or any other tertiary institution."

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Signed

Date: 15 October 2022

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I dedicate this research to my dear wife, Louisa Taylor, my two daughters and my son, Ernestina Bonney, Alfreda Bonney and Joseph Bonney Jnr, respectively. Thank you to my mother, Ernestina Quansah, and siblings, Dr Wilfred Bonney, Eric Mensah Bonney and Lydia Nana Amma Gyamfuah, for their support, prayers and continued understanding and encouragement, which urged me on to further my education. To my supervisor, Dr Raïta Steyn, thank you for allowing me to have begun and finish this journey together. I appreciate your guidance and sharing, and your knowledge and experience in visual arts education, which I will be eternally grateful for. God richly bless you.

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ABSTRACT

This study has investigated pedagogical approaches to the use of technology in Visual Arts (VA) at Ghanaian High Schools. The research has focussed on how technology interacts with established pedagogical practices and the degree of influence it exercises on training learners as future creative thinkers and productive citizens. To this end, I suggested ways to bridge possible gaps between the established traditional teaching and learning methodologies and the innovative technology-based approaches in VA instruction. Through my research, I have realised the following objectives: a) I identified the technological tools currently used in teaching and learning in VA; b) I critically discussed the way and extent to which modern technology and traditional tools are being used in Ghana; c) I comparatively assessed the impact of technology versus traditional tools and established the educational role of using technology in VA class; d) I critically analysed the related challenges and problems; e) I proposed adopting modern technological tools to facilitate practical training for improving VA teaching and learning in the concerned schools. My research was guided by the following main question: How can integrating technology and traditional tools improve visual arts teaching and learning at the Ghanaian SHS? I have adopted the qualitative methodology, based on interpretivism and the epistemological stance of constructionism, which has proved the most suitable theoretical paradigm for my investigation. This approach, linked with the study's theoretical framework and 'symbolic interactionism', has assisted me as a guideline to move from theory to data and vice-versa. Through accurate information and awareness, the study aimed to incorporate technology as an additional medium in teaching VA constructively and productively. In this context, for the understanding and correct application by the involved teachers, I have identified and developed the TPACK model as a strategy for the effective VA instruction process. The choice of TPACK has helped me to understand how individuals interact with their environment and consequently interpret and give meaning to the surrounding objects and concepts. The study sample included four South districts, high schools, twenty-four VA participants, eight teachers, and sixteen learners' artworks in Eastern Ghana. The data collection comprised interviews, observation field notes, and photos of artworks. The study finds that the integration of ICT in VA education by teachers' inadequate understanding and proficiency. The study recommends creating awareness about the importance of ICT in teaching and learning, training VA teachers on integrating ICT into their subject, and providing them full access to ICT tools.

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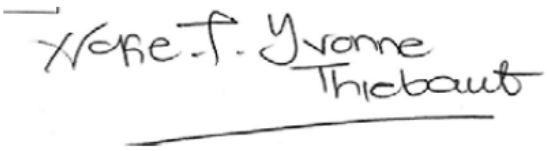

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LIST OF ABBREVIATIONS

ACOT	Apple Classroom of Tomorrow
APA	American Psychological Association
BECTA	*British Educational Communications and Technology Agency*
CAL	Computer-aided Learning
CD	Compact Disc
CK	*Content Knowledge*
CT4AD	The Ghana *ICT for Accelerated Development*
DVDs	Digital Versatile Disc
ERNWACA	*Educational Research Network for West and Central Africa*
GES	Ghana Education Service
GIIT	Ghana Institute of Information Technology
GKA	General Knowledge in Arts
ICP	*Information Technology Policy*
ICT	Information and Communications Technology
ICTs	Information and Communications Technologies
IT	Information Technology
LMS	Learning Management System
MoE	Ministry of Education
NAEA	National Art Education Association
NCITE	*National Council for Information Technology in Education*
OHP	Overhead Projector
PCK	*Pedagogical Content Knowledge*
PK	Pedagogical Knowledge
SHS	Senior High School
STEAM	Science, Technology, Engineering, Arts and Mathematics
TCK	Technological Content Knowledge
TK	Technological Knowledge
TPACK	*Technological Pedagogical and Content Knowledge*
TPK	Technological pedagogical knowledge

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CHAPTER 1

INTRODUCTION AND OVERVIEW OF THE STUDY

1.1 Introduction

Through my experience teaching visual arts in a senior high school in Ghana, I have realised that in attaining knowledge and skills, there is a serious gap between traditional approaches of teaching and using modern technological devices and software applications. Tools, such as CorelDraw, Photoshop, Illustrator, I-Pads and digital cameras, could or rather should supplement the traditional methods of teaching still based on brushes and paper. These means of instruction have undoubtedly established a positive creative role in visual arts, yet, in the framework of new directions and demands in this field, I believe that, for instance, through painting applications and devices, learners can import photos of their drawings onto computers, and plan their mood board accordingly before working with paint on canvas. Digital cameras and colour printers, electronic sourcebooks, 3D picture animation, video editing, image manipulation, drawing and painting software, the Internet and website creation can play an inspiring role in supporting learners' imaginative manifestation (Ashford 2002, cited in Zhao, Kynäshlahti & Sintonen 2016:77). Researchers such as Ashford (2002); Brown (2002); Kerrigan (2002), Mistretta (2005) and Alawad (2013) have already raised the importance of using technology in classrooms in various subjects and different grades and to enhance teaching and learning.

In contradiction to these technological advancements, in most Ghanaian schools, visual arts teachers often depend on traditional tools and medium for creation, rendering thus the process of preparation for a demo, unnecessary laborious and time-consuming. At the same time, due to the wide and fast spread of social media, a great number of learners can easily identify themselves with electronic devices and applications (Kirschner & Karpinski 2010; UNICEF 2017). As a matter of fact, mastering software applications have influenced most learners to develop themselves personally, socially, and technologically outside school, while at their learning environment they must adapt, from their point of view to another far less resourceful and a rather static framework. Therefore, since these devices have become the lifestyle of the current generation, I believe, that their adoption and adaptability will make teaching and learning more enjoyable, flexible, lively, easily comprehensible and far more productive,

especially in the context of multiliteracy teaching approaches and their pedagogical value (Steyn 2019).

Therefore, teaching skills must adapt to the current trend by a well-controlled use of technology to improve visual arts education in Ghanaian high schools. Challenged by the seriousness of the problem, I wish to engage with relevant research about integrating modern technology with traditional teaching and learning approaches in the best possible way. Instead of replacing the accustomed by unfamiliar methods, as anticipated by some teachers, the integration of existing and new elements I believe, will enhance the ongoing conventional ones. With technological devices and applications, learners can manage their creative abilities, apply instructions, and learn from distance, as manifested during the Covid-19 pandemic lockdown, continuing their uninterrupted skills training and knowledge acquisition.

1.2 Background and context

Globally, countries are faced with the challenges of preparing "their youth to become active citizens, secure employment", and above all, survive and adapt to change (Asumadu, 2019:10). Accordingly, such countries implement various interventions to boost the long-term capacity development of its youth, particularly in secondary education (World Bank 2005). Secondary education is a pre-tertiary education where reforms influence policy, types of providers, curriculum decisions, teacher capacity and training, "evaluation, accreditation and certification" (World Bank 2005, cited in Asumadu 2019:10). Countries, such as the United States, Russia and countries in Europe, implement educational policies in secondary education models to institute systems, emphasising open access and universal coverage. Reform models target public funding, open selective without any specialisation in practical modules, small and financially independent schools and materialistic control of schools (Asumadu 2019:11). First world countries often partially or exclusively finance education at secondary level. In many cases, for example the British government, fully finances secondary education where parents only ensure that children attend school. Japan's government also provides free secondary education (Nyaga 2005).

However, most developing countries implement education reforms at secondary school level by following international trends (Word Bank 2005, cited in Asumadu 2019:11) causing a change in their policies. These reforms are in line with commitment to free secondary education. The need for free secondary education is increasing in most African countries,

south of the Sahara. These countries are responding by disbursing more financial resources to secondary education reforms. Therefore, they address shortfalls in facilities by increasing instructional materials, such as classroom blocks, textbooks, resource libraries and applying shift systems to fully use inadequate school facilities. Some countries offer free secondary education while others, such as Uganda, Zambia and Tanzania, involve private contributions. Rwanda adopts 80% private schools with public subsidy (Verspoor 2008). Benin secondary education applies a paid fee system while in the Democratic Republic of Congo, parents incur 80% of secondary education costs (World Bank 2005, cited in Asumadu 2019:11). The Burkina Faso government only pays two teachers per secondary school, with the rest paid by the communities and other stakeholders (World Bank 2007).

To reach the goals of a free education system, especially in developing countries, subjects with more technology-based needs are the first to suffer, as governments cannot meet the related financial demands. Consequently, especially regarding the educational field, if the dependency on the private-sector contributors is not carefully planned and properly controlled, it might lead to severe political cost to any concerned government regarding external political and economic interference (Pauw 2017:11, 270-273).

1.3 The Free senior high school Policy

Regarding the senior high schools in Ghana, there are 863 (562 publics and private 301) that are catering for the needs of 837,204 learners, and 34,304 teachers are in public senior high schools of which 86.7% are trained (MoE 2016). In the 6–3–3–4 educational system the senior high school applies the follow program:

a) Senior high school education of three years is applied to learners aged 15 to 17 years. The curricula consist of the following subjects: English, Integrated Science, Mathematics and Social studies. These subjects are fundamental as learners are required to select out of seven elective groupings of subjects. This level of education is currently being offered for free, based on a program that had previously started, and progressively became free before September 2017.

In Ghana, the education system financially depends on public resources, even though the role of the private sector in this field is essential. Public sources of funding comprise the Ghana Education Trust Fund, the District Assemblies Common Fund, internally generated funds and loans, grants, and donations the government of Ghana receives to subsidise the cost of senior

high education to improve equal access for all. The current policy regarding senior high school education provides free education, which means free tuition, no library fees, no lodging fees, no science laboratory fees, no examination fees, no utility fees, free meals for residents and day-learners, no parents–teachers association (PTA) fees, and free textbooks for all at the senior high level. Abdul-Rahaman, Rahaman, Ming, Ahmed & Salma (2018:26) explain that these policies had as aim to increase learner-registration, "improve quality through academic" performance and, most significantly, reduce the parents' financial weight due to educational charges. Associated with the application of this at no cost high school policy, are the society's change in viewing the role of education in their children's upbringing. This change has been manifested by the increased school population attendance, proving thus the successful implementation of the above-mentioned economic policy. To contend with the challenges of this overwhelming rise in enrolment linked to the free senior high school policy implementation, the government further introduced the double tract system.

Another noteworthy conclusive remark by Alamassi, Jneibi, Kaabi, Recio, Zaatari & Panitsides (2015), is pointing at the need to develop an innovative pedagogical approach in line with the global contemporary educational context. This point is most relevant regarding my research about the integration of ICT in visual arts class instruction.

This combination of the essential traditional tools with new technological mean, I believe, will enhance learning effectiveness not only in the field of my focus, but also in response to the rising demands for excellence and innovation as schools strive to reinforce organisational and instructional efficiency through proper pedagogical approaches. In addition, a free education system may sound in economic terms as an extremely heavy burden for any involved government to bear. Yet, investing on human dynamics through education is the wisest way to choose in order to create a safe and prosperous future for any country, in my case Ghana, and its citizens.

1.4 The ICT educational role and policies in Ghana: a comparative view

In 1997, research steered by *Apple Classroom of Tomorrow* (ACOT) in USA, indicated that ICT could "improve teaching and learning by enhancing existing classroom practices and opening opportunities to stimulate cognitive processes in ways that are impractical in a classroom devoid of technology" (deGraft-Yankson 2010:21). To support programmes of teaching and learning by using ICT, findings from the UK (Loveless 2002) and from Australia

(Newhouse 2002) on the relevant subject, have acknowledged the subsequent characteristics of classroom instruction:

- Learners who learn outside the teacher's area of expertise and experience are making class management and the direction of learning more challenging.
- Less teacher-directed approaches are better suited to ICT vibrant classrooms.
- Learners might be better motivated by the task but that can also create a distraction from the intended learning.
- Traditional tasks incorporated in learning programmes are too linear—learners work more chaotically, finding new ways to express themselves.
- Extension work and support for learners with higher learning needs can be easier achieved.
- Independent learning might not direct itself towards the teacher's objectives.
- Teachers must continually update their skills and knowledge in operating and using ICT.

According to Newhouse (2002), when considering each teacher's individual capacities and choices, ICT cannot make teachers better instructors, but knowing the *how*, *when*, *where* and *why* to use ICT can facilitate their professional purpose by reaching their targets accurately.

The *British Educational Communications and Technology Agency* (BECTA) (2004) noted that the perceived benefits of fusing technology into education could be measured by the pedagogical contextual awareness of learners and teachers. Hennessy Ruthven and Brindley (2005) highlighted the conditions needed to integrate ICT into education to intensify teaching and learning, as these were deemed problematic. For instance, using ICT gadgets was not allowed during examinations, which is the result of circumstances historically created and continue to exist in the Ghanaian educational reality. Unequal access to educational sources has always been a controversial issue in many countries, especially regarding public and private schooling in terms of economic differences and urban and rural schooling, in terms of central and peripheral circumstances. Regarding Ghana, although urban and rural senior high school learners follow the same curriculum, and prescribed syllabi and theoretically operate under the same regulations and uniform adoption of textbooks and mixed standards of teaching abilities (Opoku-Asare 2000), the unequal sharing of educational resources has continued to exist among urban schools and rural centres, namely Grade A, B, C and D, and among private owned and public schools since the 1980s (Asiedu-Akrofi 1982). The unequal distribution of ICT resources among senior high schools and the unavailability of ICT

infrastructure to several of them have negatively affected the teaching and learning and the uniformity of the pedagogical targets set by the educational authorities. The persistence of the problem is illustrated indirectly by Opoku-Asare and Siaw (2015) who suggest that bridging the rural-urban gap in educational resources could promote quality teaching and learning, and thereby raise academic achievement for SHS learners in Ghana. As for the inequality between public and private schools, the present research illustrates the existing gap and proposes a solution through accurate awareness and the direct involvement of the responsible educational authorities and the main stakeholders.

The problem statement from the above information is that the use of ICT in education in Ghana is faced with several challenges, including unequal distribution of ICT resources among senior high schools, lack of trained educators' expertise in using ICT, unsupported curriculum, lack of well-established ICT integration policy, and inaccessible electricity in rural areas. These challenges have resulted in a decline in motivation among educators and learners and negatively affected the quality of teaching and learning in Ghana. The unequal distribution of ICT resources between urban and rural schools, as well as between public and private schools, continues to persist, hindering efforts to bridge the gap in educational resources and raise academic achievement for students in Ghana.

Furthermore, the introduction of second cycle institutions in Ghana for their teaching and learning are faced with the problem of access and availability of ICT, especially those in rural areas. More recent studies (Mfum-mensah 2003; Kwakye & Ghartey 2019) have revealed that most rural senior high schools in Ghana still face inadequate ICT infrastructure, a lack of trained educators' expertise in using ICT, an unsupported curriculum and a lack of a well-established ICT integration policy coupled with inaccessible electricity. Consequently, I believe that this action brought about a decline in motivation amid educators and learners using ICT for teaching and learning.

In this context, historically, applying the ICT policies in the Ghanaian education can be traced to two periods: the first starting after the educational reforms from 1987 until 1996, and the second from 1996 to 2004. The realisation of ICT's value in the Ghanaian education emerged after 1987 when the education system was restructured. Although the first educational reforms were launched in 1974, it was not until 1987 that educational policies emphasised the importance of science and technology. In 1998, the Ghanaian branch of *Educational Research Network for West and Central Africa* (ERNWACA) reviewed and analysed education. This

review focused on the period between 1987 and 1998 and was within the period the Ministry of Education aimed at three objectives of improvement: quality of teaching and learning, management efficiency, and access to and participation in basic education, whereby access to science and technology was given priority. Having also found that there was not enough research on the applications of science and technology in education, ERNWACA recommended more research into the emerging technologies and their impact on the Ghanaian education.

In 1997, the Ghana Vision 2020 was designed with the aim to identify issues about challenges of the 21st Century that needed immediate attention as stated in the First Medium-Term Development Plan (1997–2000). In their program, (Vision 2020: 88) it was recommended that access to education across all levels of society should be increased by addressing the following (a) poor educational outcomes, (b) limited access to basic education among low-income people, (c) poor quality of instruction, (d) lack of qualified teachers in basic and secondary schools, (e) inadequate instructional facilities, and (f) inefficient school management and administration.

In 2000, a draft of the *Information Technology Policy* (ICP) framework for Ghana provided information on the development of the telecommunications industry and the ICTs referring to social, economic and political life. Concerning education, the government proposed establishing a *National Council for Information Technology in Education* within the Ministry of Education, which would be responsible for developing *Information Technology* (IT) curricula. Through the proposed programmes, such as *Teach-the-Teachers*, the computer for schools' use, and the national tele-centre programme, the Ghanaian government aimed at the following goals.

a. Make IT a mandatory subject at all levels of education, both public and private.
b. Ensure that IT curricula are developed and used at all education levels (nursery, kindergarten, primary, secondary, polytechnic and university).
c. Establish IT institutions in all districts (Government of Ghana 2000:10).

Other proposed initiatives comprised establishing various IT educational centres, institutes and programmes, such as

a. an IT Accreditation Institute,
b. the Ghana Institute of Information Technology (GIIT),

c. the networking of universities and institutions of higher learning for distance education programmes,
d. the development of SMART schools emphasising IT skills,
e. the establishment of digital libraries at district assemblies,
f. the establishment of distance education virtual learning centres that will connect institutes of higher learning to pre-tertiary schools to make up for the shortages of qualified teachers and schools, and
g. the establishment of Science Resource Centres in all 110 districts and a National Resource Centre in the capital city, Accra.

The Ghana *ICT for Accelerated Development* (ICT4AD) policy document was the outcome of the 2001 draft information technology policy framework for Ghana, a comprehensive national IT plan. This policy prioritised ICT development and implementation in education by concentrating efforts on the training, research and generating resources for the expansion of ICT. The policy aimed at improving human technical expertise in Ghana and training facilitators and experts through applying ICT in education. For its successful implementation, this policy initiative had to improve the telecommunications infrastructure, install facilities in educational institutions (tertiary and pre-tertiary), and promote ICT-driven instructional systems. Moreover, distance education through e-Learning initiatives was identified to improve access to education for the Ghanaian population.

Accordingly, in 2002, President J. Kufuor appointed a committee that reviewed the entire education system and proposed ways to integrate ICT in Ghanaian education. The framework of a more inclusive and technology-driven reform stressed the expansion of distance education initiatives by including pre-tertiary and tertiary institutions, the establishment of Open Colleges to collaborate with industries and provide more education opportunities for Ghanaians, the creation of digital libraries and information services through GET, fund resources for institutes of learning, and finally, the prioritisation and promotion of science and IT in Ghana.

In 2002, the *Ministry of Education and Ghana Education Service* (MoE/GES 2002) by a policy titled, *Introducing Information and Communications Technology in Pre-Tertiary Institutions*, outlined how ICTs should be introduced and implemented in pre-tertiary educational institutions. The reforms aimed at learners becoming "*familiar with a range of technologies and have the skills to become effective, critical and autonomous users of ICT*"

(p. 5). As a follow up, the MoE released an implementation guide to the type and condition of computers to be used in public schools (a hard drive of 40 GB3 and others with Pentium 3 processors and above) as the only ones permitted for schools and imported tax-free. Consequently, the inclusion of Technology through ICT in education has challenged the traditional method of teaching and learning and changed the Ghanaian educational landscape by dividing educational thinking and training between traditional and technological approaches. This is especially applicable in visual arts due to the fast development of technological sophisticated programmes and software applications. On the use of computer technology in visual arts at the Ghanaian Cape Coast public senior high school, Kwakye and Ghartey (2019:162) highlighted that integrating ICT "has become a high priority" and "the interest and importance given to the role of visual arts or vocational skills in national development have grown rapidly in recent years".

In line with the increasing demand for skilful aptitudes and the importance of ICT in education (Kwakye & Ghartey 2019; Yelland 2001; Grimus 2000), the advent of/and accessibility to technological infrastructure have influenced learners' ability in creativity, which has positively affected their personal development. Yet, in my visit to relevant schools, I realised that most of them are still ill equipped in terms of devices and applications, a fact that poses serious quality challenges in teaching and learning visual arts Ghanaian SHS, affecting, thus, their outcomes.

1.5 Rationale and motivation

Throughout the first and second cycles of education, I was barely introduced into technological devices and applications and thought my skills and knowledge to be sufficient when and where needed. Yet, after years of teaching and adopting modern technology, which I acquired through further studies as part of career development, I have realised the requirement for integrating technological devices and applications with traditional methods in the teaching and learning of visual arts, especially for practical training at senior high schools in Ghana. Professionally, I believe my research on using modern technological devices and applications in schools will sharpen my knowledge and skills, while, in terms of time management, it will help my teaching process in delivering subject contents, administering class exercises, assessing assignments and getting quick feedback. I also believe to improve my career development and excel as a professional teacher by enhancing my capability in pursuit of further studies and my professionalism in any position I will find

myself. Also, my senior learners, I trust, will benefit by comprehending the practical concepts in visual arts through modern technological applications. Furthermore, through relevant publications, teachers and learners will be led to better understand these concepts and apply them where and when necessary. Thus, the rationale of my study is to critically analyse the pedagogical approaches to using ICT in visual arts at senior high schools in Ghana, identify the causes for the reluctance to adapt innovative approaches and assess the pedagogical role of technology in teaching this subject. This study intends to enhance the existing knowledge on the development of performance skills on education in general in Ghana and beyond. I trust that by developing and sharpening their technological skills, learners can better deal with life events and properly prepare their future, personally and professionally as responsible, and independent Ghana citizens. Hopefully, my study will serve as a research guide or reference in academia and other corporate entities.

1.6 Focus and purpose of the study

This research focusses on how technology interacts with established pedagogical approaches and the degree of influence it exercises on the development of learners as future creative thinkers and productive citizens. Therefore, this study explores how teachers use ICT tools in the visual arts classroom and assesses the interactive communication between teacher–sender and learner–receiver within the context of the *Technological Pedagogical and Content Knowledge* (TPACK). This study's purpose is also to find ways to bridge the gap that presently exists between the different approaches applied in teaching and learning visual arts in Ghanaian senior high schools. To this end, I investigate the following related issues.

1. Identifying the technological tools used in teaching and learning
2. Examining how and extent at which modern technology and traditional tools are used
3. Establishing the educational role of using technology in class
4. Assessing the impact of the joint use of technology and traditional tools in visual arts teaching and learning
5. Critical analysis of the related challenges and problems
6. Propose how best to adopt and adapt modern technological tools to facilitate practical training approaches for improving teaching and learning in the concerned schools.

1.7 Theoretical and conceptual framing

The best way to understand how teachers can practice ICT in their classrooms is by focusing on relevant information on how and to what degree to integrate technology with other familiar approaches in education. Various opinions voiced by visual arts teachers and ICT experts suggest that any proposed framework for ICT integration into visual arts should be liberal enough to make teachers crucial players in its adoption and implementation. To reflect this vital concern, the ICT consideration is believed as an appropriate reference to the ICT modules described in this framework. Due to the fast progress of technology, Siemens (2005) claims that connectivism is a more contemporary and relevant learning theory to meet the rapid speed of change—expanded expertise requires continuous learning (and unlearning) of the overwhelming amount of lifelong information that can no longer be preserved within an individual's mind but is now better stored and processed by technology. This approach is similar to Vygotsky's (1962) fundamental social constructivist theory, which involves learning, attention and problem solving through network participation, where the intellectual activity is a process of linking and creating mental and physical networks to know where to find the needed information to assist those of know-how to substantiate other learning systems (Howell 2012:28). Since connectivism effects various aspects of life, I will focus only on its impact on learning. In this context, my study will be supported by

a) the *Pedagogical Content Knowledge* (PCK) promoted by Shulman (1986) and
b) the *Technological Pedagogical and Content Knowledge* (TPACK) model developed by Koehler and Mishra (2006).

According to the TPACK framework, specific technological tools (hardware, software, applications, associated information literacy practices) are best used to instruct and guide learners toward a better, more robust understanding of the subject matter (Sharma:2). Its application emphasises "how the connections amongst teachers' understanding of content, pedagogy, and technology interact with one another to produce effective teaching" (Koehler & Mishra 2013: 101). Connectivism, on the other hand, is a theoretical framework for understanding teaching and learning in a digital world. Connectivism underscores how internet technologies and many web browsers contribute to new learning approaches (Simon 2022).

1.8 Research questions

The primary research question is:

- How can integrating of technology and traditional tools improve visual arts teaching and learning at the Ghanaian SHS?

My secondary queries are:

- What are the current technological tools being used in VA teaching and learning, and how are they being used in conjunction with traditional methods?
- Why are these pedagogical approaches used?

1.9 Contributions/limitations of the study

This study I believe, will benefit visual arts teachers and learners to enhance their knowledge and skills through technology. It will contribute to government efforts to efficiently equip schools with technologies while academically serving as a reference document. Learners will develop independency and competency with adequate information on technology applications in a global market. Personally, I, as a researcher will be well armed with much expertise to guide my learners and contribute nationally and internationally on studies relating to technology integration in teaching and learning. Recommendations can be beneficial to design a relevant curriculum in visual arts, with focus on integrating technology in teaching and learning approaches.

Transmission hitches, data collection expenses and job tasks are substantial limitations in pursuit of an academic project of such magnitude. Scarcity of information and access to publications, especially in a country with a third-world economy system as in Ghana, might serve as constraints to information gathering. The scope of work will be time-consuming and costly in terms of data collection and searching for materials, while distance will limit frequent field work visits. The process is inspiring but might prove costly.

1.10 Structure of the study

This research is presented in eight chapters, followed by the related references, as explained below.

Chapter 1 contains the introduction, the background and the educational context within which the research will be conducted. It starts with a brief background on the global perspectives of the issue being researched in and then I pin it down to Africa and focus on Ghana. This is followed by the rationale and motivation, the study's focus and purpose, its theoretical and conceptual framing, the research questions guiding the study, a brief description of its contribution, and limitations and conclusion of the chapter.

Chapter 2 comprehensively reviews the literature relevant to this study's queries on integrating technology with other conventional approaches in education. Chapter 2 is divided into two parts. In Part 1, I give an education history by studying past educational systems and institutional developments within the political framework of Ghana. In part two, I discuss several viewpoints expressed by visual arts scholars and ICT experts, analyse controversies with particular attention to my aim and expand on ICT integration with visual arts by creating greater awareness about innovative thinking to allow for more flexibility and initiative for teachers.

Chapter 3 explores the theoretical framework on using technology based on a synthesis of Shulman's (1986) PCK model and Koehler and Mishra's (2006) TPCK model. This chapter forms the core of the phenomenon as it analyses the conceptual framework and substantiates the selected methodological tactics.

Chapter 4 discusses the research design and methodology, which concludes with a self-evaluation regarding the principles and quality of the trustworthiness regarding this study's approach, judgements and thematic organisation, ethical considerations, and the limitations of the study.

Chapter 5 presents and analyses the collected and classified data in two levels. Level 1 comprises an opened-coding method applied on the artworks created by visual arts learners from the selected schools. Level 2 discusses and critically analyses the relevant findings.

Chapter 6 critically discusses the findings and brings to the fore relevant issues of the entire study.

Chapter 7 provides the conclusions and delivers recommendations related to the enhancement of teaching and learning the visual arts subject in Ghana.

1.11 Conclusions

This chapter provides a brief account of the study by giving a clear route map of what will follow. It has presented a summary of how the study is conducted by outlining the background of the research and the educational context within which it develops. The chapter has highlighted the focus, purpose, reasoning, importance and the critical questions of my scholar endeavour.

CHAPTER 2

REVIEW OF LITERATURE

2.1 Introduction

Chapter 2 presents a detailed review of the literature regarding queries on how to integrate technology with other conventional approaches in education in the context of Ghana's pedagogical policies. It discusses various understandings communicated by visual arts scholars and ICT experts, with special attention to the aim—ICT integration with visual arts to allow for more flexibility and initiative to teachers. This chapter will be guided chronologically to illustrate historically, wherever possible, the development of acceptance, integration or rejection of technology in Ghanaian schools. The purpose of reference to older research in the background and context and literature review is to illustrate the diachronic existence and persistence of the problem of accepting or rejecting innovative approaches in education. If the problem has been faced and solved in practice, especially in developed countries, Ghana persists despite the goodwill of the Ghanaian authorities to update their policies following streams globally adopted.

Technology has affected all spheres of society, particularly in education. Teachers and learners are now exposed to significant quantities of data, technological tools and technological resources that have transformed classroom learning while affecting the everyday life of learners regarding applications of technological tools and use (Holtje 2019:3). The influx in innovative technologies has consequently led to the development of new techniques and media technologies that have considerably influenced the artistic field and enhanced the current educational system. Consequently, the field of visual arts and arts education have been considerably affected by introducing technology using special effects to transfer and shape creative ideas. The recent developments raise the question of whether the existing art educational curriculum in Ghana must be revised to include technology in art education that encompasses new technological and traditional approaches in terms of enhancing the creative thinking of learners (Holtje 2019:3).

Therefore, the literature review will refer to relevant theories, controversies, and approaches and critically assess the benefits, problems, and challenges regarding approaches applied in visual arts education through technological means. Hence, I have structured this chapter thematically, divided into two parts. Part 1 will cover the **contextualisation of the research:**

educational systems and development and **Part 2** will discuss the **traditional teaching vs. educational technology in visual arts: exploring controversial perspectives.**

2.2 PART 1: CONTEXTUALISATION OF THE RESEARCH: EDUCATIONAL SYSTEMS AND DEVELOPMENT

2.2.1 Secondary educational reforms in Ghana

Governments continuously reform public organisations to improve the quality of services. The education sector is a crucial public service influenced by managerialism and economic rationalism. Educational reforms emphasise educational efficiency, effectiveness and accountability (Poku, Aawaar & Worae 2013). In discussing educational reforms, the focus is placed on changes and transformations regarding educational philosophy, learner-centred policy, curriculum, pedagogy, didactics, organisation, management, financing and links with national development (Vasquez-Martinez, Giron, De-La-Luz-Arellano & Ayon-Bañuelos 2015).

Revolving between social construction and state regulation, educational reforms are often influenced by political agenda. After the independence of Ghana from the British colonial rule in 1957, the national education sector has experienced several reforms, as this field has always been a priority on the agenda of its successive governments. The sector is replete with constant changes in pursuing a suitable model believed to match the country's development needs. In this framework, Ghana's education sector reforms have focused on improving the quality and quantity of education for three successive decades. In this context, quality concerns override all other objectives to the point that heightened electoral promises largely have reforms at the expense of rationality (Ampramtwum et al. 2016). One of the sections most affected is the number of years of attendance in secondary education, which, in Ghana, have persistently been changing depending on the reform decisions made by one or other government. For example, the secondary school education spanned four years during the government of Colonel Ignatius Kutu Acheampong (1972–1978), leader of the National Redemption Council (1974). which he later transformed into the Supreme Military Council in 1975.

The Provisional National Defence Council in 1987 reduced the secondary school education from four to three years and changed it from the five years at ordinary level and two years at

the advance level the old system to three years lower secondary and three years of upper secondary (new system) to bring the secondary educational system up to speed with the changing trends in future workforce development **(**Adjabeng 2018). The New Patriotic Party in 2000, overturned the period of four years only to be reverted to the three-year system under the National Democratic Congress administration from 2009 until present (Adu-Gyamfi, Donkoh & Addo 2016).

2.2.2 Educational structure in Ghana: reforms of 1974

Initiated by Dr Kwame Nkrumah, the 1961 Act 85 aiming at Free Universal Primary Education made education compulsory and free for all. Section 2(1) states that each "*child who has attained the school-going age (six years) as determined by the Minister shall attend a course of instruction as laid down by the Minister in a school recognised for the purpose by the Minister*". Section 20(2) also explains that there shall be no fee other than the payment for providing reading material or essential stationery and other resources required by learners for use in practical work and shall be levied for schooling at public primary, middle or special schools. The Ghanaian Education System, at that time (end of the 1960s), comprises six years of primary education, followed by four years of secondary education. At the end of the four years, suitable learners went on to complete a "two-year sixth form course that could lead to a three-year university course" (Asumadu 2019:15). Learners, who were unsuitable to remain finished "two years of pre-vocational classes" (Asumadu 2019:15).

The educational system under Dr Kwame Nkrumah was soon regarded as too long and too academic. Thus, 1974 saw a reform of the system under the National Redemption Council, instating the Junior Secondary School on an experimental basis. The Junior Secondary School introduced practical subjects and activities, allowing learners to acquire occupational skills, which, after an apprenticeship, led to the qualification for self-employment. Due to a wide range of factors, such as the economic decline, bureaucracy and sheer lack of interest, the Junior Secondary School system never went beyond the experimental phase. According to Asumadu (2019:17), after the failure of Junior Secondary School system, which failed to cross even its pilot stage, by 1983, a period of crisis hit the education system. The government was unable to meet the urgent needs for educational materials, school maintenance costs and at the same time decrease registration fees, the cost of which caused the dropout to rise. With the intention to draw a picture as accurate as possible of the historical background of the

educational endeavours to implement suitable educational reforms in Ghana, I feel the need to provide the following information based on surveys as referred by Asumadu (2019:15-18):

According to the primary descriptions of the 1974 modifications, the following is included:
Kindergarten: a two-year education for children between four (4) and six (6) years.
Basic First Cycle Education: six (6) years Primary for children between the ages of six (6) and twelve (12), and three (3) years Junior Secondary School for children between twelve (12) and fifteen (15) years (Asumadu 2019:15-16).
Junior Secondary School: after a selection, learners were sent to the following terminal courses: a) a two-year Senior Secondary (Lower) course leading to the GCE O Level,
b) to three years Technical, Vocational and Commercial courses (Asumadu 2019:16).
Learners from Senior Secondary (Lower) would then pursue another two-year Senior Secondary (Upper) course to obtain the GCE A Level or enter Teacher Training Colleges and the Polytechnics (Asumadu 2019:16).

Also, those from the Technical, Vocational and Commercial schools could enter the Polytechnics or Technical Teacher Training Colleges. Learners from the Senior Secondary (Upper) could proceed to the university to pursue a three (3) year programme. Those from the other streams would eventually end up at the University level (Asumadu 2019:16).

2.2.3 Anamuah–Mensah and Post Anamuah–Mensah reforms of 2007

The Anamuah–Mensah Report recommended a similar education structure as the Evans–Anfom Report of 1986. The difference was the inclusion of two years of kindergarten education as part of Basic Education and Apprenticeship training for leavers of the Junior Secondary School who cannot or do not wish to continue in the formal sector. Kindergarten was not an integral part of basic education, and the reform incorporated it to prepare learners between the ages of four (4) and six (6) years before they enter primary school. The apprenticeship training aimed to formalise the training of school leavers in various trades. The committee maintained the three (3) years Senior Secondary School, but the government decided to increase it to four (4) years and rename the educational system Junior high school and senior high school to replace the existing Junior Secondary and Senior Secondary Schools.

The New Patriotic Party (NPP) government (2001–2008) also considered the educational structure for restructuring. The committee to make recommendations on the reform was tasked to review the country's entire educational system to make it responsive to challenges at the time. The underlying factors for introducing the Junior High and Senior High School reforms were to address the inadequacies and shortcomings in the previous reforms, as discussed above. The reforms were also introduced for the following reasons: the formation of human capital for industrial growth and ensuring competitiveness in the global economy; the ability to use developments in Science and Technology, especially information and communication technology (ICT); the radical transformation in the field of work and employment; and the preservation of cultural identity and traditional indigenous knowledge and creativity. These reforms intended to ensure 100% access to basic education, placing high premium on technical or vocational education and training and improving the quality of instruction by making it flexible enough to accommodate diverse learner abilities.

In 2009, when the National Democratic Congress (NDC) government came to power, they implemented amendments on the previous reforms taken by the committee under the leadership of Professor Jophus Anamuah–Mensah. Crucial among them was the reversal of the four-year senior high school programme to the previous three-year duration. Members of the review committee settled for maintaining the three-year senior high school programme after deliberations; however, it was nonetheless pushed to four years by the National Patriotic Party (NPP) government. The NDC government decided to reverse the duration to three years upon assumption of power in January 2009, which brought to the fore its attendants' debate by which the National Association of Graduate Teachers and the Conference of Heads of Assisted Senior High Schools took opposing stands on the future duration of the senior high school programme. However, until date, the three-year senior high school programme is still in implementation, even though the NPP is in power (Asumadu 2019:18).

2.2.4 Educational policies

Educational policy is an intentional attempt to influence practices to bring about changes in teaching and learning through the influence on the practices of target groups (e.g., teachers, principals, education directors). Government and education policies in the educational domain comprise laws, rules, principles, decisions and guidelines overseeing the process or operation of education systems (Tiongson 2016). The why of a policy is critical to be well comprehended by the primary agents, i.e., teachers, as it concerns an implicit rationale

explaining the reasons to fulfil the pertinent educational goals (Cobb & Jackson 2014). Educational policies are in place to ensure the successful and effective operation and management of schools. Furthermore, they highlight that educational policies enhance learning for all learners, regardless of their sociocultural or economic status and their religious or ethnic identity. In short, the aim of an educational policy is to increase educational opportunities for all. Educational policies secure financial support to schools for the improvement of learners' skill performances and standard expectations (Kumi & Seidu 2016).

In the context of Ghana's educational policy, the Ghanaian educational system provides finance for free tuition, which includes free textbooks and open access to teaching and learning resources. Furthermore, provision is given for subsidies of exercise books and other learning material where necessary. Currently, with the free visual arts practical learning material needed in senior high schools, the government has been sending materials, such as acrylic paints and cardboard, to various schools offering the subject. However, the materials are limited and do not sustain their activities for the entire year; hence, learners end up purchasing it themselves. Furthermore, parents must provide for the learner's sustenance, their school uniforms, school bags and school stationery and transport (Akyeampong 2009).

2.2.5 Nature of policy implementation

Policy implementation and application are vital stages in policymaking processes. Policy implementation involves the execution of law where all stakeholders and institutions collaborate with methods and other procedures to place policies into effect to achieve its objectives. Policy implementation follows a process involving relevant stakeholders and establishments and follow specific practices for control (Khan & Khandaker 2016). As such, it is important that policies for the people be appropriately applied as it will benefit the citizens once its success is positively correlated with how it is put into practice. Successful policy outcomes depend on designing effective systems and managing their implementation as stressed by Khan and Khandaker (2016) as well as Van Deventer and Steyn (2022). In the 1992 Constitution of the Republic of Ghana (Article 38) it is expected from the government to offer compulsory but free for all access to basic education; however, it depends on the availability of financial funds and resources (Kumi & Seidu 2016). Policy changes concerns expenditure structures, financing schemes and management (Tiongson 2016).

2.2.6 Implementation and resistance

Policy implementation involves conducting a policy decision, usually in the form of a statute or executive order or court decisions. Implementation includes transforming physical, financial, and intellectual resources into service delivery output, such as facilities and services. Implementation sets goals and turn policy mandates into action. Policy implementation might take the form of top-down or bottom-up approaches (Delamaza 2015).

The top-down approach involves conducting policy decisions where the decisions are centrally located by actors who seek a specific preferred effect. The top-down approach to policy implementation represents a system of command and control, from government to project, concerning people. It is considered rational and a comprehensive approach to planning. Regular to democracy, state officials pass on the implementation to public administrators (civil service) and seek for accountability. Sabatier and Mazmanian (1979) identified that six conditions are required for effective implementation: a clear objective, causal theory, the legal structure of the implementation process, committed officials, and supportive interest groups (OECD 2013).

The top-down approach policy implementation uses central bureaucratic actors to manipulate policy implementation to minimise actors, limit change, and locate sympathetic agencies to implement policies. This approach is characterised by a structure and hierarchy designed to provide accountability. The approach portrays traditional elitist conception where elected representatives are considered the only actors within a society to legitimise collective binding decisions on the public (Political Pipeline 2013).

Bottom-up theorist's advocate for policy development at the local level. With the bottom-up implementation approach, policy initiates with base groups by advocating that if local administrators are kept out of policy development, the implementation process regarding local conditions might fail. Therefore, goals, approaches and actions must be deployed with special attention to people directly impacted by the policy (Political Pipeline 2013).

2.2.7 Technical challenges

Effective quality education delivery revolves around educational policy implementation processes. Educational policy implementation is a daunting process (Mokhaba 2005) and might take different shapes and forms in diverse cultures and institutional set ups (Paudel

2009). Policy-change literature indicates that each policy has strengths and weaknesses and its suitability might differ from policy areas, culture, economic, political and time regimes and the degree of change. According to Fullan (2007) and Tinsae (2016), educational change is technically simple but socially complex. Each stakeholder requires to have a shared vision of the change and the commitment to follow it. In most processes of policy change and implementation, tensions arise between technical and political contenders. Policy change and implementation is a multi-actor and multi-level approach characterised by complexities creating benefits and risks. Passing policies does not necessarily guarantee outcomes, as implementation is a crucial part of the process. Challenges persist where the situational context and belief priorities of implementing agents differ across policy areas and systems (OECD 2013). Elmore (1978) identified four primary ingredients for effective implementation: (1) clearly specified tasks and objectives that accurately reflect the policy's intent; (2) a management plan that allocates tasks and performance standards to sub-units; (3) an objective means of measuring sub-unit performance; and (4) a system of management controls and social sanctions sufficient to hold subordinates accountable for their performances. Overcoming the complexity of aligning intended policy objectives with contextual conditions is essential.

Communication is vital in policy implementation. Appropriate formal and informal communiqué between individuals, groups and departments foster implementation, political support and positively contributes significant force in the implementation process (Gaffron 2003; Kapucu & Demiroz 2017). Implementing public policies is a decentralised endeavour—adapting policies at top levels, implementation and enforced by actors at lower levels. Therefore, policy outcomes rest on the readiness and capability of actors to implement the policy timely and reliably.

2.2.8 Ghanaian policies on using ICT in education: diachronic development

After independence in 1957, like various other state institutions and organisations, the education system, moulded on the British system, has undergone several reforms (Poku, Aawaar, & Worae 2013). The consequent challenges regarding politico-economic and sociocultural adjustment have been thoroughly studied from various viewpoints. In his fundamental study on the nature and meaning of cultures at large, with reference to the Third World new states formation, Geertz (1973:339-340) explains the challenges there had been created and challenges concerned communities trying to develop a national identity based on

ideologies strange to their worldviews and traditional principles. Due to the heterogeneous nature of the African societies of the new states, primarily characterised by multi-linguistic communication means and ethnic primordial concepts (Geertz 1973:277-279), the realities of such national co-existence should be seen through a kaleidoscopic prism, best described by the South African paradigm, self-labelled, as the rainbow nation. Sometimes the familiarity, acceptance and integration between diverse cultures might be smooth and successful, whereas, in other cases, it might cause severe conflicts with disastrous outcomes.

Regarding the national education reforms, they differ because the motivations of the reforms differ. A reform focuses on changing existing systems due to unique combinations of historical, cultural, institutional and political factors (Psacharopoulos & Patrinos 2002). Therefore, educational reforms involve a change in political processes, with distributional consequences in allocating benefits and costs. Timing offers prospects for policy entrepreneurs to present ideas for public discourse (OECD 2013). Open and flexible dialogue in various settings is a crucial to exchange ideas, information and alternative visions at any stage of policy reform processes. Crucial concepts are understanding local interests, government goals and objectives, private-sector interests, specific political agendas and grassroots concerns and donor partners so that the donor might be familiarised with the specific political, economic and cultural contexts within which policy reform occurs (USAID 2007; Maetz & Balie 2008).

Since the 1990s, Ghanaian education authorities have been examining how computers are used in schools and their role in learning (Boakye & Banini 2008:2). At the beginning of the 21st century, education stakeholders in Ghana took on numerous projects introducing ICT at school, at primary and secondary levels. In line with the national development in Ghana, the ICT for Accelerated Development Policy emphasised the “need to transform Ghana into an information-rich, knowledge-based, and technology-driven” economy and society. To this end, the Ministry of Education Youth and Sports and Ghana Education Service (MoE/GES 2002:2, 10, 13, 17) proposed that ICT in schools must determine the type of ICT needed for teaching and administration. It was asked to include it as a learning tool in the school curriculum at all levels and provide tools and means of standardising them in all schools. Furthermore, before the end of each education level, schools should ensure ICT literacy skills and training for teachers and learners.

The government of Ghana introduced its ICT4AD in the later part of 2003 (Alemna 2006). According to the policy's basic premise, Ghana's development process can be accelerated through the development, deployment and exploitation of ICTs within the economy and society. The overall aim of ICT4AD was to engineer an ICT-led socio-economic development process to transform Ghana into a middle income, information-rich, knowledge-based and technology-driven economy and society (Ghana Government 2003).

The visual arts curriculum followed in Ghanaian senior high schools comprises eight subjects: basketry, jewellery, ceramics, graphic design, leatherwork, picture making, sculpture, textiles, and a compulsory general knowledge in art. Rapitsenyane, Moalosi & Mosepedi (2022) state that a significant number of African countries continue to provide instruction in traditional subjects such as woodwork, technical drawing, and metalwork, while also incorporating some elements of technology education. The choice of the programme depends on the resources available in each school. According to the Teaching Syllabus for visual arts (TSfVA 2008), each learner opts to study three of the eight subjects: in addition to GKA, which is studied by all visual arts learners, one elective from the two-dimensional category (Group A) depending on the school's resources, and one from the three-dimensional category (Group B). In this context, technology offers opportunities for enriching and transforming visual arts teaching, providing teachers and learners alike with new tools to access, organise and present information and enrich lessons through multimedia (Bridwell & McCoy 1991; Schwartz 1991; Garnons-Williams 2002; Wood 2004; Kwakye & Ghartey 2019). Furthermore, the arts and craft have established a link between the old methods and contemporary approaches to doing art. Various techniques in artforms, such as painting, sculpture, leathers, and basketry, are preserved for generational benefits. Different skills and styles employed in the old days are still incorporated into modern art, retaining its aesthetic and quality appearance. Artists can demonstrate their finest creativity in creating works that are attractive and which will sell high in the market due to the attention they demand.

As mentioned in Chapter one, urban and rural senior high school learners in Ghana follow the same curriculum and prescribed syllabi, operating under the same regulations and characterised by a uniform adoption of textbooks and mixed-ability teaching (Opoku-Asare 2000). The teaching approach is based on the transmission of information, a model (i.e., storytelling model) that takes its roots in the traditional oral culture outside the school. Adopted by many teachers, this dominant storytelling model involves much pouring in and

spreading of knowledge (King 1990). It is also significant that the recent years have witnessed studies on the extent to which schools are developing the capacity to integrate ICT into teaching, learning, and school management processes. Buabeng-Andoh and Issifu (2015:1512-1519) remark that Ghanaian teachers' perception on using technology in education in second cycle institutions has been limited compared to senior high schools in developed countries. The problem has also been identified in a recent study by Kwakye and Ghartey (2019:163), who stress that "there is not much information on how ICTs are being diffused and used by teachers in Ghanaian schools" compared to the clear and available information on using ICT "in high schools in developed countries".

The statements made by Kwakye and Ghartey (2019:163) and Buabeng-Andoh and Issifu (2015:1512-1519) about developed and developing countries support the importance of this study. Furthermore, it would make this study worthwhile to see how much has improved since the quantitative-based research on using computer technology by visual arts teachers in the metropolis of Ghana by Kwakye and Ghartey, which was conducted in Ghana only a few years ago. Additionally, the impact of Covid-19 on teaching and learning and, subsequently, the dependence on technology as an educational tool during this challenging time, makes this study, in my view, worth the while.

2.3 PART 2: TRADITIONAL TEACHING VS. EDUCATIONAL TECHNOLOGY IN VISUAL ARTS: EXPLORING CONTROVERSIAL PERSPECTIVES

2.3.1 Traditional approach versus educational technology: controversial viewpoints

The traditional teaching methods are teacher-centred and include presentations and discussions while problem-solving elements are presented by and or discussed with the mentor. The curriculum or syllabus, the resources and teaching materials, learner-tasks and other assessments are determined by the teacher and transmitted to learners in various presentations (Cottrell & Millis 1993:40-60). Active learning involves learners and helps them to have an in-depth understanding of the programme through the induction of practice, in other words, inductive teaching has better results than productive teaching (Alder 1999:241-247).

Referring to traditional methods of teaching and learning, Tomei (2010) defines it as teacher-guided instruction placing the learner in a submissive role rather than an active learning

position, requiring firm compliance to the teacher's directions. In line with this view, Mbodila and Muhandji (2012) argue that traditional approaches of teaching and learning involve the direct flow of information from teacher to learners. The former being the sole authority to instruct and propose a problem-oriented instruction, which I believe, has its merit, but how compatible can it be with today's global highly technological and speedy advancements must be seen. Chetty (2013) propounds that technology can transform education by extending the learning space beyond the four walls of a classroom and argues that it is the best means to obtain the attention of a new generation of learners and interest in their subjects. Marx (2014) adds that in a traditional classroom setting, one lecture or assignment is given to all learners and the teacher expects the same outcomes from everyone; thus, overlooking differential learning styles and the theory of multiple intelligences. Similarly, teaching Visual Arts in Ghana has been mostly done by conventional (traditional), slightly sophisticated teacher-centred methods rather than modern learner-oriented applications and techniques. Thus, the transmission of knowledge and informational has been realised with the usual forms of talking or discussions requiring the physical presence of the learner and teacher in a specific time and space. However, the teaching methods used might differ regarding the degree of influence on active learning (Cottrell & Millis 1993; Bonner 1999). Furthermore, inductive teaching methods increase subject application and retention and performance assessment and evaluation with better subsequent future career paths for learners who study a given subject from a textbook (Kelley et al. 1999). Bonwell and Eisons (1991) propose the following techniques to support and promote active teaching and learning:

- Using computers and visual media (video, multimedia slides)
- Using simulations, role playing and graphics
- Using collaborative learning
- Encouraging learners to take notes during class
- Encouraging learners to solve problems during case studies

Below is a comparison between traditional and moderately evolved teaching methods, as presented by Cottrell and Millis (1993:40-60).

Table 2.1 Traditional and moderately evolved teaching methods

Traditional teaching methods	Moderately evolved teaching methods
• Reading texts and problem solving • Formulate questions • Attending classes • Monitor discussions • Writing and replying brief on extensive and objective type questions • Solving short or lengthy unstructured problems and cases • Oral presentation of topic, and reply to short questions from the learners' studies	• Video watching • Attendance and participation in class • Technology application using simple systems • Role playing • Simple modelling • Understand technology • Simulation learner-centred

Source: Cottrell and Millis (1993)

Misconceptions towards ICT integration among visual arts teachers have been reflected by such a strong negative attitude that stirred an extensive concern among researchers (Roland 2010; Mohd Khairizan 2014; Konak 2018:53-; Kwakye & Ghartey 2019). Coleman and Cramer (2015) indicate that numerous Art educators are unwilling to embrace technology into creative spaces due to the concern that it will have a negative impact on the learners' creative and artistic manifestations. Wang (2002) (cited in Delacruz (2004)) reports on the continued reluctance on the part of visual arts teachers to embrace new technologies and refers to a study of accomplished Art teachers and quality art education (Bamford 2001) that did not mention the inclusion of ICT. While some resistance to integration might be attributable to age, research cited in Delacruz (2004) suggests that although many Art teachers are applying more ICT, most use only basic applications (such as word processing) rather than applications designed to enhance creativity.

Also, Howard and Mozejko (2015) attribute teachers' reluctance to apply technology either to a lack of confidence and embarrassment due to the difficulty to understand computer errors or to access the needed information caused by Internet connection problems. Such small yet intimidating enough problems can make teachers feel out of control and their professional competence questioned. As colleagues and learners become increasingly familiar with digital technologies, some teachers might feel their authority threatened and might develop a

negative attitude towards innovative teaching approaches and using new devices or unfamiliar resources. Worse even, for a teacher trying to fix such problems during the teaching and learning process might result in learners becoming disengaged and disruptive. The findings of relative studies explain the cause of this phenomenon as a lack of the following factors: teaching experience with ICT, such as on-site support; help supervising children when using computers; ICT specialist teachers to instruct learners' computer skills; computer availability; time required to successfully integrate technology into the curriculum; and financing technological infrastructure (Winnans & Brown 1992; Dupagne & Krendl 1992; Hadley & Sheingold 1993; Rosen & Weil 1995; Mumtaz 2000). Kwakye and Ghartey (2019) unsurprisingly identified resistance to organisational change and outside intervention, time management problems, lack of support from the administration, and teachers' professional and personal perceptions and prejudices towards unfamiliar innovations.

All these circumstantial and sentimental issues have created controversies around educational approaches. Furthermore, teachers find it particularly challenging, if not impossible, to integrate technology in their approaches since the technologies they need are either not at all available or not easily accessible to them or their learners (Ely 1999). Highlighting ways to integrate the traditional with innovative technology-based approaches, Mumtaz (2000) identifies three authorities that must co-ordinate their efforts: the policy makers, the school and the teacher. More recently, Kwakye and Ghartey (2019:163-164), referring to Ghana, mention four stakeholders who must participate in the process of planning, taking and implementing decisions in education. Most recently, in the South African context, a highly democratic state, the importance of collaboration between three stakeholders has been thoroughly analysed. According to Van Deventer and Steyn (2022:53-69), an educational system based on transparency, awareness and proper knowledge of the relevant subject matter can play a critical role in promoting teaching proficiency and learning capacity.

The social contract between citizens and educational authorities is the assigned syllabus extracted from the curriculum to guide the learners to perform well through pedagogy, in line with the overall personal and national objectives of raising human resources, capable of transforming available resources to make life meaningful and attractive to society. The pedagogy best employed is by demonstration, participation and lively activity. Activity-based methods are employed to expose learners to a scene to replicate assisting them to explore and identify their creative skills. Usually applying Edward Thorndike's *Theory of Connectionism*

(1989), built on the basis that learning is the outcome of the link formed between stimuli and responses, teachers mostly demonstrate to elicit responses from learners. Despite the positive and vital role traditional teaching approaches carry, they create some stereotypical concepts by rejecting innovative approaches, staying in a static point regarding space and time.

Consequently, art and technology to some are opposing concepts that when combined become poor substitutes of traditional instruction media and methods. Furthermore, the combined approach threatens to devalue human originality and skill. Nevertheless, computer technology simultaneously demonstrates its powerful presence in arts as it continues to influence most aspects of the visual arts industry. Galleries, museums, art dealers, auctioneers, buyers, publishers and art practitioners from most art disciplines have found ways to take advantage of the digital revolution. Consequently, the impact of computer technology on the visual arts shares many similarities with the preceding discussion. Like the camera, the computer has contributed to how we observe and interpret the world.

2.3.2 Shortcomings of traditional teaching and learning approaches

The traditional approaches of teaching and learning are faced with several limitations in their delivery, i.e., a single mode of information where the instructor typically talks for long, followed by questions asked with the anticipation that the learners should be able to answer with the same response that has been taught. The following limitations in traditional teaching and learning approaches identified by Mbodila and Muhandji (2012, cited in Annku 2014:16) include:

- Teaching and learning centres around a theoretical approach instead of a practical section; hence, less practice in the real-time cases
- Insufficient interaction with learners in the classroom
- Lack of creativity or originality because learners are expected to reproduce what their instructor have taught them repeatedly
- Inadequate involvement of learners since the teacher is the primary instructor and sole information provider

The controversies about using technology emphasise the need for a balanced integration of the traditional, familiar with the innovative and unfamiliar means. Their integration in visual arts education, I believe, will help learners becoming actively involved through hands-on

activities rather than by sole traditional ways. Furthermore, it will develop a learner-teacher relationship where the teacher functions as an observer by standing back and allowing the learners to find solutions to given problems. Adapting technology in an integrated and properly controlled way in the nowadays teaching I believe will promote productive interactions between teachers and learners and support creativity, active learning and higher-order thinking individually and collectively.

2.3.3 Factors hindering the diffusion of technology in schools

Factors hindering educational technology use in schools include socio-economic, moral ethics, and inequitable access to technology for all learners, causing some teachers to avoid requiring learners to use technologies for assignments at home. Several factors have militated against using ICT in education in Ghana, such as a shortage of funding to support the purchase of resources relating to digital technology, the lack of training of teachers, and the absence of motivation on the part of teachers to adopt ICTs as teaching tools in classroom instructions. Furthermore, due to the potential negative consequences and ethical dilemmas attached to technological free and easy access to pedagogically harmful information, many schools find it necessary to restrict using various technologies, considering them as a moral imperative to monitor internet use, limiting learner access to technology. Pelgrum (2001) presented a list of 10 such factors impeding ICT integration in schools, with four major being:

a) subjective views about the contribution technology can make to the processes of teaching and learning and classroom management,
b) teachers' lack of knowledge and skills,
c) insufficient number of computers and ICT infrastructure, and
d) challenges in integrating ICTs instruction in classrooms.

In a linked study concerning ICT integration in classrooms, Ely (2013) distinguishes three primary factors: dissatisfaction with the status quo, existing knowledge and skills and the availability of innovative technology in classrooms. According to Mooij and Smeets (2021), school managers' policies, budgetary issues and the general attitudes of school managers (their commitment and decisions) are crucial for an unhindered ICT innovation process. Despite the advantages of technology in education, researchers have indicated that ICT integration into art classrooms was far from achieving its aim (Mohd Khairezan & Au 2017). Roland's (2010) research on art teachers' significance level of ICT incorporation in visual

arts revealed that most teachers consider ICT integration as a moderate priority, whereas 33% stated that it is a low priority. Furthermore, research by Coleman and Cramer (2015) indicate that many teachers are reluctant to embrace ICT into art classrooms due to the concern that it will decrease learners' creativity, artistic expression and understanding of art forms. This misconception towards ICT integration among art teachers has reflected their negative attitudes as a significant issue requiring extensive apprehension among researchers (Roland 2010; Mohd Khairezan 2014; Konak 2018).

A recent report revealed that the readiness of ICT in sub-Saharan Africa is still minor, with most countries experiencing strong lags in connectivity because of the insufficient development of ICT infrastructures (Global ICT Chart Report: Guardian, April 2012:6). While the developed world continues to witness ICT development, sub-Saharan Africa is lagging due to inferior quality services. Ranging African countries on the global ICT Chart, the report indicated that African countries suffer from severe weaknesses in all components of the ICT index, ranging from poor connectivity caused by expensive and poor-quality ICT infrastructure to very low levels of basic skills and a weak framework for technology (Guardian, Friday April 2012:6).

Teachers' traditional ideologies concerning the framework of aesthetics and their beliefs about the incompatibility between technology and art have been identified as barriers to adopting ICT (Hicks 1993; Matthew, Callaway, Letendre, Kimbell-Lopez & Stephens 2002; Wood 2004). Studies have indicated that some art teachers view ICT as gimmicky (i.e., something that is not serious or of real value) and easily misused, and some fear loss of learner creativity (Crowe 1988) and a focus on replication of art (Rogers 1995). Interestingly, Taylor (1999) noted that photography, in its early history, faced similar resistance when debate ensued as to whether it should be considered an art form. Additionally, Loveless (2003) documented instances where teachers felt that the school network was set up on a business model, which was unhelpful in the context of an art space.

While some defiance to integration might be attributable to age, research mentioned in Delacruz (2004) suggests that although many art teachers are using more ICT, most use only basic applications (such as word processing) rather than applications designed to support creativity. Wood (2004) highlights that while some teachers believe technology maintains learner engagement and provides inspiration, others were concerned that learners could be easily distracted by technology.

Resource constraints have been recognised as pedagogical barriers by certain researchers, such as Henning (2000), Wang (2002), as cited and discussed by Delacruz (2004). According to Delacruz, these papers have identified poor training opportunities, lack of support and time limits as significant impacts on visual arts teachers' willingness to integrate ICT in their instruction process. In addition, regarding the teaching professional development, it has been found less effective when it does not focus on a specific content area facilitated and supported by technological means (Wood 2004).

More recently, the issue has been thorough discussed by Alhumaid (2019 (2019:13)). Based on studies by scholars like Fried (2008), Wentworth & Middleton (2014), she critically analyses their findings which point at the negative affect of technology on the education process. Based on a broad list of researchers, Alhumaid (2019:13), has identified certain harmful influences globally applicable. This broad spectrum, can explain to a great degree the unfriendly attitude towards the ICT integration in Ghanian teaching and learning. The summarised list reads as follows:

a) Deterioration of aptitudes, as it has been noted in the performance of the learners regarding their basic skill development in reading, writing and arithmetic.
b) The dehumanising influence of technology defines its negative pedagogical impact on the class communication. After observation, educational technology has been characterised as impersonal and robotic harmful to the human, personal aspect of the relationship between teachers and learners, consequently dehumanising the school environment and as a result, other aspects of the human life as well.
c) Detachment is another harmful consequent of the ICT integration, as the attention of learners is driven towards a personal discourse with an impersonal, visually rich bank of information. By means of a contemporary digital and virtual platform, learners may learn far more and faster yet gradually grow up through a system that isolates them in many ways from social interaction.
d) Pedagogically, it has been argued that accessibility to the required technological tools develops awareness of /or underlines social inequalities between those who have and those who have-not, which from educational viewpoint is an irresponsible approach.

The reluctance to implement ICT integration in class teaching and learning process in Ghana, is not a unique phenomenon. Based on the scholarly supported findings that illustrate the

pedagogical damage of technology in various parts in the world, Alhumaid (2019), continues analysing the above controversial issues as follows:

a) Deterioration of learners' aptitudes in basic skills: reading, writing and arithmetic

Contrary to the general belief that the use of technology in the classroom enhances learners' academic accomplishment and improves their inspiration to complete their tasks (Alhumaid 2019), scholars like Bishop & Verleger (2013), Clarke & Svanaes (2014), Spitzer (2014), Haßler, Major, & Hennessy (2015), and Izadpanah & Alavi (2016), Al-Hariri & Al-Hattami (2017), as cited in Alhumaid (2019:13), have argued that much dependence on technology-skills leads to the opposite results affecting negatively the learners' capability in "reading, writing and arithmetic", as the contact with printed text, pen and paper lost their principal role in the classroom. With reference to students and future scholars, they do not acquire much knowledge from Google Books the comparable to the traditional published books or magazines. However, there are also risks involved when applying technology in the class environment. Alhumaid (2019:13, citing Spitzer (2014)) warns against its negative effect on learners' educational activities. Alhumaid refers to Spitzer (2014)'s literature affirming that writing and reading become weakened by mechanically entering information on a keyboard, and that IT constructed data is "shallow" since it has not been properly processed through a comparative thinking approach. Zainab and Kler (2019:176) assert that the reliance on technology in teaching math and numerical calculations poses numerous potential dangers.

According to Alhumaid (2019) technology has also been blamed for harming critical and sharp thinking, because learners who read tangible, linear texts develop a better comprehension, critical thinking and a sharper memory than those who read via the Internet. Citing Carr (2011), Alhumaid (2019:14) explains that having replaced paper with screen it has also influenced the process of research because it has a serious effect on the amount of devotion researchers give to their quest and the depth they are prepared to engage with. As for more examples of negative impact electronic apparatus such as tablets, smartphones, iPhones and laptops on learners' performance have, Alhumaid (2019:14) refers to Strain-Moritz (2016), a qualified teacher with empirical knowledge, who ascertains that texting has a negative impact on learners' ability to write complete sentences, with grammatical errors in terms of sentence construction or incorrect use of punctuations. In general, thus, it is believed that the Internet effectively causes shallow, side-tracked or unfocused reading and thinking due to mechanical movement of the cursor and learning without constructive and meaningful depth.

b) The dehumanising effect of technology

According to this argument, by allowing learners to visualise the required information in a better, visual way, as through PowerPoint presentations, maps and charts, the increasing use of technology has dramatically shortened the amount of material taught in class in terms of time and work effort, but also face-to-face interaction, I believe. On the other hand, this overdependence on technology in classrooms has caused a serious consequence, which has been defined as the "dehumanising effect". With reference to teaching and learning process in class, according to Alhumaid (2019), who citing Kemp et al. (2015) explains that certainly, over the last ten years, teaching has lost its humanism since the human factor of its endeavours, the soul of the profession has been vanished in the whirls of technology. Indeed, from this point of view, in higher-education institutions and online courses, for instance, lecturers present their lessons from afar, and learners are required to interact with machines rather than humans. Similarly, this applies to secondary education too. The ultimate outcome points at teachers who know minimal or even nothing about their learners' personality, studying strengths and shortcomings, namely to a phenomenon that subsequently results to no humanly interactive relationship between the instruction-sender and the learner-receiver.

According Alhumaid (2019), besides this damaging effect, based on Nye's research (2006), technology takes you completely out one's, physical, familiar environment. You really do tune out the world" and that today's "college students are habituated to a world of online blogging, instant messaging, and web browsing that leaves electronic traces". In line with this interpretation of the ICT integration, Kazan et al. (2016), Izadpanah and Alavi (2016) and Nye (2006) (cited in Alhumaid (2019:13), have also highlighted the dehumanising effect of technology on learner-teacher relationships. She refers to the studies by Izadpanah and Alavi (2016) on the attitudes and skills of a high school learners in Iran, who used computers as a tool to facilitate learning English as a foreign language. Interestingly, according to their studies' findings, approximately 58% of the learners involved in the survey believed that using computers has had a dehumanising effect.

b) Technology and social isolation

This category emphasises the contrasting difference between the most distinct features face-to-face teaching, and the technology-based teaching. While the former develops a climate of collectivism, neighbouring norms and group collaboration, the latter creates an environment that excludes physical togetherness, and collective participation. According to Alhumaid

(2019), the consequences of this feature from a psychoanalytic viewpoint defines a situation of isolation, developed as a defence mechanism undertaken by the mind when individuals are caught in a context that they find threatening or unpleasant. Thus, learners who frequently use technology gradually develop a feeling of comfort and security when 'wired' to their devices and start staying away from all means of social networks that might disconnect them. In 2001, Paul and Brier (2001), as explains Alhumaid (2019), coined the word 'friend-sickness' to refer to the isolation students feel when moving to college and leaving old school friendships behind. Young students pretend that technology bridges that gap in relationships and provides the impression that those friendships have not faded away but are still strong. Lee (2009:510) as cited by Alhumaid (2019), argues that isolation created and enhanced through technology is dangerous and could negatively affect learners' social development. The observation that a computer is placed in an individual's room rather than a family room and that a child uses a computer alone without any other family members' presence amplifies concerns about social isolation and harmful influences on children's social development. These findings call for attention as the attraction of virtual world entangles learners and isolates them externally, as they are seen most often glued to their machine and internally, as they are not exposed to group interaction, an eventuality which may interfere negatively with their social development.

In short, social remoteness and loneliness seem to be the conclusive consequence of learners' use of technology because, being entirely absorbed in controlling the classroom with digital appliances, they frequently forget trusting or interacting with their classmates.

d) Technology and the gap between social classes

Another negative aspect of dependence on technology in education is the significant social gap technology creates between rich and poor learners in a class environment. Beyond this locally felt differentiation, an external, on an international level, substantial differences between developed and developing countries are prominent especially in the infrastructure of schools. While schools in developed countries are provided with most technological devices (PCs, laptops, tablets, projectors and Internet access), developing countries to a high degree lack these devices, resulting in students graduating with limited basic technological skills (e.g., PC literacy) and facing huge problems to find a well-paid job or compete in the global market.

To maintain a fair balance in this discussion, according to van Dijk & Hacker (2011), as cited by Alhumaid (2019), even in developed countries there is a social divide caused by the digital invention in the life of learners and students. A significant difference exists between learners coming from different social backgrounds. Less fortunate learners might have access to technology in classrooms but cannot afford any gadget at home. This shortage is brought to the fore through their academic achievement, when compared to outcomes of those peers who come from an economically comfortable household. Furthermore, as mentioned by Alhumaid (2019:19), according to a report by the National Telecommunications and Information Administration, US urban citizens are 50% more likely to have access to the Internet than those staying in the country (Steele-Carlin 2017 cited by Alhumaid 2019:19). Interesting from a comparative viewpoint, another African country is Egypt. Reported by Warschauer (2011) and cited by Alhumaid (2019:16-17), is the case Egypt, where private educational institutions and universities have better working areas in terms of technology when compared to government schools and universities. This is a significant contrast which is reflected in the various levels of knowledge among the former students from both forms of schooling.

2.3.4 Technology integration in education

Educational technology can be defined as "any tool, piece of equipment, or device, electronic or mechanical" (Davies 2011:46) assisting learners to accomplish specified learning goals It comprises instructional technologies intended for teachers to communicate proper instructions and the learning tools for learners to achieve their specific performance objectives (Davies, Sprague & New 2008). It is cited as a motivating factor to adopt ICT and, consequently, can engage and inspire learners (Grenfell n.d.; Long 2001; Wood 2004). Furthermore, Becker (2000) mentioned the need for computers to be seen as problem-solving machines to solve regular curricula and typical school problems, especially issues concerning learning, instructing, or school administration. Lankshear, Snyder and Green (2000) argue that learning would be made more effective and their output enhanced if teachers selected the best suitable technology tool to use in education. Likewise, Smith, Hardman and Higgins (2006:32-33, 443-457) believe that ICT is an essential factor in promoting quality teaching and learning.

While in the initial stages of technology awareness, people globally were even afraid to touch a computer. Nowadays, almost everybody can use it and its tools, such as hardware and

software, input and output devices, storage devices, and most importantly, Central Processing Units and Random-Access Memory, especially in the context of the social changes, lockdowns and communication needs that Covid-19 globally brought along. Regarding educational norms and school policies, using mobile phones by learners at school premises caused critical concern to teachers who imposed strict rules prohibiting or restricting learners from using them. Vanderhoven, Schellens, Vanderlinde and Valcke (2015) highlight the responsibility of schools to alert learners on how to safeguard when using certain social networks and social media and educate them about internet security. Currently, relevant scholar research promotes using computers, tablets, notebooks and mobiles for transmitting educational knowledge (Seedat 2019).

To facilitate telecommunication and the digitally sharing of information across boundaries, ICT encompasses a range of human-devised hardware, namely, computers, scanners, digital cameras, and computer software, such as database, multimedia programmes, and telecommunications infrastructures. ICT can allow learners to enhance their self-expression and creative thinking by focusing on the message rather than the execution of artworks, instructed through formal or informal traditional media training (Long 2001; Wood 2004). Mistakes can be easily corrected, decreasing anxiety and promoting experimentation, which lies at the heart of creativity (Grenfell n.d.; Wood 2004; Wilks, Cutcher, & Wilks et al. 2012). From a practical viewpoint, equipment and computer software programmes allow to digitally access, retrieve, store, organise, manipulate, present and communicate locally, nationally and globally (Dunmill & Arslanagic 2006; deGraft-Yankson 2010).

Combining visual imaging and computer technologies has affected various disciplines in terms of precision, speed and distance specialised collaboration, such as medical diagnosis, prosthetics, air traffic control, space flight, weather prediction, telecommunications, audio-visual recording and national security systems (O' Connell 1993). Following Scardamalia and Beriter (1994), knowledge in communities and learning organisations has gathered attention as societies move from the industrial era into the information age. For Watkins and Biggs (1996), the policy to enhance educational effectiveness with increasing interest in using computers to stimulate learning, computer-aided learning (CAL) software has focused on this growing education market. Consequently, to accomplish the intended learning outcomes, the call for technology integration in education, in other words, implementing educational technology into educational curricula in senior high schools, has increased dramatically.

e-Learning is also a means of education based on modern methods of communication, including the computer and its networks, various audio-visual materials, search engines, electronic libraries and websites, whether accomplished in the classroom or at a distance. This type of education is typically delivered through the World Wide Web where the relevant educational institution makes its programmes and materials available on a special website so that students can use and interact with them easily through closed or shared networks, the Internet, via e-mail and online discussion groups (ICDE n.d.). Ellis (2004) disagrees with authors such as Nichols (2003) who define e-Learning as strictly accessed using technological tools that are web-based, web-distributed, or web-capable. However, Ellis believes that e-Learning covers content and instructional methods delivered via CD-ROM, the Internet or Intranet and includes audio and videotape, satellite broadcast and interactive TV (Benson et al. 2002; Clark 2002). Tavangarian Leypold, Nölting, Röser, and Voigt (2004) included the constructivist theoretical model as a framework for their criticism of e-Learning. According to their findings, although e-Learning has taken a wrong direction, it remains procedural, as it can transform an individual's experience into empirical knowledge through a constructive process. In arts, therefore, technology can facilitate instruction by interaction between the established, accustomed approaches and innovative, unfamiliar ones.

In comparison to İşman's new instructional design model (2011) based on the theoretical foundations of behaviourism, cognitivism and constructivism, the model's primary goal is to organise long-term and full-learning activities. Based on the instructional system theory, the model is divided into five stages: input, process, output, feedback and learning. During teaching and learning activities, learners are active and use cognitive, constructivist or behaviourist learning to construct new knowledge. Educational technology materials are used to create new information, and these materials are related with goals and objectives.

The teachers' training programmes nowadays prepare them by including technology in their future classroom teachings, which demands them to study and finish at least one technology integration programme (Jia et al. 2017, as cited in Strycker 2020:2). The National Art Education Association (NAEA) holds firmly the use of technology and technology-related tools in visual arts education ((NAEA 2015:2). The association supports blending technology in visual arts education as a 21st century skill, with the opinion that visual arts provides learners the privilege to develop and build their skills and capacities in many areas, such as developing information, media and ICT literacies (NAEA 2016a, cited in Strycker 2020:2).

2.3.5 Integration of ICT in visual arts education

Traditional methods primarily rely on textbooks, whereas the modern method relies on hands-on materials approaches. In the traditional method, the presentation of materials starts with the parts, then move on to the whole, whereas modern/technological approaches of materials start with the whole, then move to the parts. The traditional method emphasises basic skills, whereas modern methods emphasise big ideas. With the traditional teaching method, assessment is an activity integrated with teaching and learning and occurs through portfolios and observations (Brooks & Brooks 1999). The teaching of various disciplines in a class has already moved beyond using a blackboard and chalk to using simple computer programmes, such as Microsoft PowerPoint, to facilitate education delivery. A study conducted by Nouri and Shahid (2005) suggests that teaching using such software as PowerPoint helps learners' understanding of a topic and is considered more fun, triggering student attention and resulting ultimately, into better student performance in the final examinations.

In the context of traditional approaches in arts education, these are frequently supported by drawings, paintings, sculpture, printmaking and photography. Teachers and learners use traditional teaching materials, primarily paints and brushes, grey or colouring pencils, inks, paper or canvas. Mbodila and Muhandji (2012) argue that traditional approaches of teaching and learning involve the direct flow of information from teachers to learners. These are the required skill sets essential for artistic foundation and growth (Holtje 2019:3). By applying these basic skills affords learners the chance of enhancing their observational drawing skills and thinking abilities to view the world through artistic eyes. Besides, drawing exercises, as with any exercise in another subject, require much practice and is time-consuming; most of the work is completed as homework.

Homework is a customary practice in teaching of school-based subjects, as it has been found to promote learning (Rayburn & Rayburn 1999; Peters et al. 2002). As such, teachers frequently assign homework because they believe that the preparation work requires additional effort by the learners and will give them motivation to study further (Rayburn & Rayburn 1999). Besides, home assignments have, as an additional goal, the initiation of cognitive and experiential problem-solving techniques, which are considered highly helpful for a student's future career (Davidson & Baldwin 2005).

Regarding the visual arts' practical requirements, i.e., in preparation of the final ideas, learners are encouraged to work on their sketches or drawings in their sourcebooks beyond the classroom. The Ghanaian Creative Arts and Design Curriculum for Basic 7–10 (Common Core Programme) expects learners to "apply their knowledge in dealing with issues both in and out of school that extends learners' knowledge through homework, project work, community engagement suggestions, etc." (MoE/GES 2020:15). Similarly, the South African Visual Arts and Design Curriculum, known as the Curriculum Assessment and Policy Statement (CAPS) states:

> Informal assessment is the daily monitoring of learners' progress and can be done through questions and answers, short written activities completed during the lesson, open-book tests, homework exercises, case studies, etc. It should not be seen as separate from the learning activities taking place in the classroom (Visual Arts CAPS 2011:39).
>
> …section A (the process) has the same weighting as section B (the final product)" and therefore, "learners should have enough time to do their preparation... Due to the preparatory nature of topic 1 [the process], learners are allowed to complete work at home. (At least 60% should be done in the classroom (Design CAPS 2011:50).

It is frequently to the advantage of teachers to use many different formats and modes to teach the subject matter of a lesson. The current arts technology comprises "3-D printers, laser cutters, friendly software design as well as desktop machine tools which avail knowledge on how to use, change and also improve modern technologies" (Sweeny 2018:349). These software applications are typically used by learners outside the classroom, such as photo-editing applications and software for games promoting the design of 3D structures, calling for learners' interests in mastering new skills in technologies at school level (Sweeny 2018:349). It is imperative that skills in traditional and technology approaches in visual arts be taught concurrently because they will be used in the everyday life of learners. The current Ghanaian visual arts curriculum does not provide for an inclusion of traditional and technology approaches in the classroom.

According to Galvez (2018), numerous authors, such as Reeves (2007), Dwyer (2011), Melnick, Whitmer and Strickland (2011), and Caldwell and Vaughan (2012), have noted that art education deserves an extraordinary part in the heart of education curricula due to numerous accounts regarding its benefits, primarily in reasoning and critical thinking. Hartle (2015) likewise considers art education as one of the primary components of greater heights for academic achievements. However, in the framework of combined and critical

environmental factors, school, home, and community, Melnick, Strickland and Witmer (2011:1-38) assessed their pedagogical influence and the role of arts in the development of learners' cognitive ability. They concluded that although the impact of an integration of arts in school programmes on student achievement is not as strong as "suggested by previous research", the connection between arts and the development of cognition, individually and collectively, is stronger than anticipated. Therefore, from a human-centred viewpoint, in an individual's development process, in the tightly interwoven forces, the sociocultural identity, emotions and cognition, creative arts can play a constructive pedagogical role. Through their ability to evoke emotive reactions and challenging responses from creators and art perceivers, emotions might vary from sentiments of pleasure, joy, marvel and awe to fear, indignation, and even disgust (https://iep.utm.edu/art-and-emotion). Hence, the human mind should not stand still and idle if one forgets the traditional approaches. Therefore, the advantages of homework are summarised as follows:

a. Obedience: therefore, disciple
b. Challenge: testing new skills and knowledge
c. Development of creative thinking followed by critical thinking: i.e., thinking of solutions followed by selecting the most suitable solutions
d. Applying rules: the student finds the solution through creative thinking

Advocating the co-existence between traditional art processes and innovative technologies, Wang (2002) and Wood (2004) extend the possibilities of art expression, communication and perception in combining existing traditional ways with innovative approaches. With an ever-increasing emphasis on still and animated imagery, symbols, and iconography in society, the analysis, interpretation and evaluation of visual representation have become just as vital as innovative creative abilities. Learners must be wise consumers, familiar with how the mass media operates; therefore, visual arts education has a crucial role to play in preparing learners as visually literate and critical thinking members of society (Schwartz 1991; Brown 2002).

A section of people regard technology as a threat to originality, which would replace traditional art making. According to the 2019 state of art education survey, approximately 52.2% of art teachers have the desire to learn more about teaching digital art; however, only 21.9% are willing to teach the digital arts curriculum confidently. Although digital art demands no less skill compared to traditional art making, it requires a varied form of thinking (Abbey 2019). It is imperative to note that when learners learn traditional art technology, they

can better comprehend the materials and complete their projects. From the literature, researchers designed two tables. The first table (Table 2.2) focuses on the differences between traditional and ICT-enabled pedagogy. The second table (Table 2.3) highlights the benefits derived using the traditional approach versus the technology approach in teaching visual arts.

Table 2.2: Difference between traditional and ICT-enabled pedagogy

Traditional Pedagogy	**Technology-enabled Pedagogy**
Teacher-centred instruction	Student-centred instruction
Primarily words and text	Multimedia
The teacher prescribes activities	The learner determines activities
Learners analyse individually	Learners work in teams
Delivery of information	Exchange of information
One path to finding solutions to problems	Multiple paths to finding solutions to problems
There is no link between theory and practice	Integrates theory and practice
Teacher-directed	Student-directed
Focus on facts and knowledge	Critical thinking and problem solving

Source: Abbey (2019)

Table 2.3: Benefits derived from traditional approach versus technology approach

Traditional Approach	**Technology Approach**
Hands-on experiences	Increased access
Unique pieces	Convenience
Increased versatility	Instant shareability
Forced problem	Increased productivity

Source: Abbey (2019)

Similarly, Abbey (2019:1) highlights that technology will not cease anytime, and it will be improved consistently at a faster rate. With the COVID-19 lockdown experienced globally, people were forced to rely more on technology. The pandemic has speedup digital transformation by many years, indicating that traditional and technological art education is an essential and absolute blend in teaching visual arts education. Table 2.3 lists the benefits derived using traditional and technological approaches in teaching visual arts, as found in the literature.

The remarkable technological developments have affected the visual arts to a high degree

(Duncan 1997; deGraft-Yankson 2010; Kwakye & Ghartey 2019). However, the integration of ICT in visual arts is not merely using a computer for typing and printing questions, browsing, and delivering lessons through PowerPoint, but also in teaching diverse topics in visual arts. Understandably, the ICT integration in visual arts instruction has created severe problems; since the 1980s, literature has been documenting concerns about visual arts teachers' willingness to integrate ICT in their teaching (Duncan 1997; Matthew, Callaway, Letendre, Kimbell-Lopez & Stephens 2002; Kwakye & Ghartey 2019). For instance, teachers' traditional ideologies concerning aesthetics, and their beliefs about the incompatibility between educational technology and art, have been identified as barriers to adopting ICT (Matthew et al. 2002; Wood 2004). Unsurprisingly, according to recent findings by Kwakye and Ghartey (2019), despite the benefits of educational technology in visual arts, less than 50% of teachers and learners in the Cape Coast Ghanaian schools that had been offering visual arts, "had unrestricted access to the school computers and 26 [%] had never used computers".

Due to the positive impact of ICT integration in visual arts instruction, the educational reforms in Ghana, launched in September 2007, placed high emphasis on integrating ICT in all subject areas. Several studies have revealed that due to its innovative and creative nature, educational technology plays an essential role in teaching and learning arts education globally, including Ghana (Kwakye & Ghartey 2019). This point was already noted in late 1980s by Crowe (1988), arguing against the resistance of teachers who, due to "out of date ideas", refuse to adapt and integrate computer use in their instruction approaches. Crowe (1988) commented that ICT should be included in the visual arts education Curriculum as it can enhance learners' creativity by offering the means to change images on the screen rather than on paper or canvas before the last stage of a product's creation. Furthermore, incorporating ICT in visual arts education, while offering learners the necessary knowledge and practical experience in response to market needs (Thomas, MacMillan, McColl, Hale & Bond, 1995), it helps the development of specific skills, including writing, communication, interaction, collaboration, critical thinking and self-consciousness (Wilks et al. 2012). Long (2001) refers to the educational role of technology in visual arts instruction and marvels at the incredibly exciting contemporary times of the new possibilities offered for its development. Therefore, due to the positive impact on teaching and learning visual arts (Becta 2003; Ittigson & Zewe 2003, Stankiewicz 2004:88), it is essential for teachers in senior high schools to integrate technology for supporting creativity in their teaching to enable learners to better understand the visual arts concept taught. Educational technology has provided expectations for change in terms of

enriching the visual arts education subject area. The adaptation of ICT tools in visual arts instruction can change pedagogical approaches radically and improve individual learning outcomes by transforming the classroom's social practices (Forgasz & Prince 2004; Goos 2005).

Consequently, visual arts teachers in Ghana can play a significant role nationally and, hopefully, internationally in art education, where they encourage learner participation and academic engagement, theoretically and practically, due to their capacity to manage multiple modes of teaching, through demonstrations, organising activity-based, participatory/individual projects, or outdoor field trips. According to Howard and Mozejko (2015:3), "Teachers also engage in online professional learning, and share online resources within and beyond their schools, and even internationally". Therefore, technology can be of use indoors to help teachers in creating an interactive classroom environment and outside the classroom to enhance learners' learning processes and complement what is learned in a classroom setting. The above can empower learners to access information and analyse it critically in their time and space (Dadzie, Nantwi, & Issah 2020:364).

Teachers deliver subject content through notes from various texts and demonstrate artistic creativity by drawing using traditional materials, such as cardboard, whiteboard markers, coloured pencils, objects, crayons, brushes, and coloured inks. Learners study their notes and texts, convey assignments in their drawing books or submit their projects. The assessment is twofold: formative (class assignments, exercises, projects, group work, presentations) and summative (the end of semester examination) (TSfVA 2008). Using technology can indirectly facilitate the identification of design problems, enhance artistic decision making, and learners become exposed to diverse means of creating artworks, hence, providing new opportunities for learning (Phelps & Maddison 2008:2). The campaign in favour of ICT continues advocating its functions not only as a problem-solving tool and group collaborative exercise, but also as a powerful key opening new horizons for a real-world experience through simulation, manipulation and imaginative expression. These factors have never been highlighted before in a conventional art classroom (Mohd Khairezan 2014). Moreover, apart from promoting a learner-centred pedagogical approach where the learners construct their knowledge, meaning, and solutions to problems and briefs (Hopper 2016), technology integration into art classrooms can boost learners' imagination and critical thinking skills by

enhancing and facilitating their ways of communicating their artistic ideas (Chou, Chang & Chen 2017).

With reference to the South African social context of multi-literacies, multiple intelligences and a multi-cultural co-existence, Steyn (2019:156) writes that "creative thinking and critical thinking should not be regarded as two opposing factors, but rather as two constructive forces that can co-exist, interconnect and function congenially together". The author explains how in South Africa, the subject, Design, "has greatly been assisted by technology", and simultaneously, "the integration of artistic thinking, as creative ability on the one hand, and the continuous newer achievements of technology enriching realisation tools, have brought forth the need for a literacy education, in other words the need to further train concerned educationalists to better understand relative literacies related to both factors, creative thinking and suitable use of technical means". Furthermore, Sujee (2019:83-84) argues that "Teachers need to become lifelong learners and equip themselves with necessary skills to stay relevant to the needs of the 21st-century learner" and stresses the importance of "technological literacy" as a skill that is "in demand" and "necessary for survival in a digital world", especially in the context of a 21st-century South African "multilingual language classroom". Moreover, Sujee (2019:84) explains that it is "no longer a matter of which technology to use, but how to use the relevant technology in the classroom".

2.3.6 Digital technology in the visual arts classroom

According to Mai (2019), computer multimedia technology is a new type of IT. It uses computers to comprehensively apply functional technologies, such as text, image, audio and video. It has integration and interactivity and can display digital information through the interface. By adjusting this part of multimedia IT, the relevant technicians can perform various complicated information function calculations, improving the efficiency of information processing. The application of multimedia technology can help users analyse and process various complex information data. Simultaneously, it can enhance the security of computer multimedia technology analysis and processing, enabling computer technology to generate more application functions. Multimedia technology must combine the various communication, computer, audio-visual and other various functional technologies to conduct collective application development. In computer multimedia technology, digital technology is a crucial tool, teachers can use in the art classroom for instruction, lesson planning and learner interaction. The computer has been around for many years and has been a crucial

factor in globalisation in the educational setting. Learners are increasingly connecting with others globally and learning using the computer in more diverse ways than ever. Digital art has been quickly expanding since 'Sketchpad' was developed in the late 1960s by Ivan Sutherland. Learners today have been born into a digital world, and it is imperative that teachers make the most of all types of available technology.

Working with materials is fundamental in visual arts education and is considered essential for a full understanding of art (Wilks et al. 2012). Through manipulating materials and artistic actions, one can discover and understand the world of visual arts (Eisner, 2002, as cited in Wilks et al. 2012). Visual art teachers can ensure their learners engage in ICT in the visual arts classroom by exploring and understanding emerging pedagogies (Wilks et al. 2012). According to Al-Hanna (2013), today, art learners can observe a procedure for a lesson given by a teacher from products, such as a smart board, document camera, In-Focus, ELMO, iPad, and many other technologically advanced devices. Learners are learning in ways far beyond the traditional. Today's children are born into a complex, digital, technological age. Learners in the classroom are referred to as 'screenagers', 'digital natives' or 'digital kids'. Educators firmly believe that technology, such as interactive hypermedia technologies, supports using constructivist teaching methods in the art classroom. Staley, who is the principal of a consulting firm, executive director of the American Association for History and Computing, and History professor for the University of Maryland University College, states "a computer is a business tool; for a teacher, a computer is a library; for the researcher, the computer is an archive; and finally, for the artist, the computer is a canvas" (2000:2).

When educators think of digital technology, they realise it is intermingled in every aspect of our daily lives. Our ideas of art are changing because of interactive software and learning web sites and for the making and interacting of digital art, which are available and expanding daily. Furthermore, art education is where digital technology has its power for societal change in a way that learners can interpret core subjects. Learners can now join others globally and experience a global network sharing, viewing and interacting with many art forms.

Digital art has many types of art applications and installations, some of which are film, video and animation, Internet art, software art, virtual reality and musical environments. "Installations come in various sizes and forms, and many are directed to creating environments which can strive to envelop the audience in a projected space to those that immerse them in a virtual world" (Paul 2008: 139).

Al-Hanna (2013:57) outlines the following principal ideas for digital art integration in the visual arts classroom:

- When combined with traditional instruction, computers can increase learner learning in the modern art curriculum and basic skills areas.
- Integrating computers with traditional instruction produces higher academic achievement in various subject areas, such as art, vs. the traditional instruction alone.
- Learners learn more quickly and with greater retention when learning using computers.
- Learners like learning with computers and their attitudes toward learning and school are positively affected.
- Using computers appears most promising for low-achieving and at-risk learners.
- Effective and adequate teacher training is an integral element of successful learning programmes based on or assisted by technology. Technology is best used as one component in the art classroom in a comprehensive improvement effort.
- Art teachers must be adequately trained to use technology.
- Technological resources must be sufficient and accessible.
- Effective technology use requires long-term planning and support.
- Technology should be integrated as one component into the curricular and instructional framework.

2.3.7 Incorporating 21st-century skills in the visual arts classroom

Concerning the importance of 21st-century skills, the US Department of Education conducted a study that outlines the principal ideas regarding incorporating technology in the curriculum. Educators in different studies stated several reasons for bringing technology into their schools.

- **Support thinking processes:** Many teachers cited a belief that computer-based technologies could support thinking processes. Many respondents stressed opportunities that technology provides for acquiring problem-solving skills, either through instructional software designed to teach problem solving or through the many requirements for solving problems that naturally emerge when one is using computer tools to accomplish a task (Ghavifekr & Rosdy 2015:175-178).
- **Stimulate motivation and self-esteem:** A second frequently cited rationale for introducing technology was to stimulate motivation (Mooney 2003) and self-esteem

through either personal experience or a literature review. Many innovators perceived the dramatic effects that technology can have on learners' interest in class activities and sense of their capabilities.

- **Promote equity:** In the case of several schools serving learners from low-income homes, technology innovators stressed the importance of giving these learners the technology tools to equip them to compete with children from more affluent homes where technology is commonplace.
- **Prepare learners for the future:** The concern for equity is related to a fourth major motivation for introducing technology to prepare learners for the future. Respondents at several sites foresaw a future where higher education and the world of work would be infused with technology. These educators argue that schools have a responsibility to give learners (especially learners from low-income homes) the confidence and skills in using the technology they will need after graduation.
- **Explore technological capabilities:** In several cases, some individuals were simply intrigued by new technologies and wanted to explore what they could do (US Department of Education).

Concerning the importance of creative and critical thinking in the 21st century, Birgili (2015:72) argues that creative thinking is related to critical thinking and problem-solving, and identifies three dimensions of creative thinking: synthesising, articulation, and imagination. Synthesising involves combining information to produce novel solutions, articulation involves expanding knowledge to find unique solutions, and imagination involves using flexible thinking to generate new insights. Birgili (2015) cites the works of Gilhooly, Ball & Macchi (2015), Kember & Leung (2009), and Liu, He & Li (2015), who outline the following characteristics of creative thinking: flexibility, authenticity, multiple thinking, wondering, fast and independent thinking, openness to criticism, rationalism, skepticism, ability to generate different solutions, ability to understand and define the problem, and ability to propose potential solutions.

Sternberg (2013), as cited in Birgili (2015), defines creativity as the ability to generate original and valuable ideas through imaginative action. Wright (2010), also cited in Birgili (2015), notes that creativity combines problem-setting and problem-solving skills to produce meaningful solutions. ICT presents unique opportunities for supporting creativity (Brown 2002) and extending visual arts "beyond clay, crayons and paint" (Stankiewicz 2004:88). This

potential was recognised as far back as the 1980s when Crowe (1988) commented that ICT could assist with exploring design problems, enhance artistic decision making and provide new opportunities for learning. Since then, the literature has highlighted the potential for ICT in supporting visual arts teaching: "For visual education, these are incredibly exciting times offering new possibilities" (Long 2001:262). Technology tools such as scanners, colour laser printers, digital cameras, and image manipulation software i.e., video editing, drawing and painting tools can all play a positive role in supporting learners' artistic expressions (Kynäshlahti & Sintonen 2016:77). In his article, *Here's How Technology is Shaping the Future of Education*, Bernard (2017) suggests that "…technology is already sweeping through classrooms as educators and developers create more and more products designed to enhance education".

Newbill and Baum (2012), cited in Birgili (2015), emphasise the importance of creative and critical thinking skills in today's technology-driven and problem-filled world for learners facing various challenges while Steyn (2019) suggests that imagination skills play a crucial role in problem-solving. By approaching problems from different perspectives and making connections between abstract and concrete factors, individuals can use their imagination skills to create positive outcomes in product realisation. Steyn (2019:3) states that the key to success lies in the harmonious interaction of creative and critical thinking, where the insight imaginative ability and the data, information, and knowledge learned from external sources come together. Thus, the use of imagination skills helps in approaching problems in a constructive manner.

Critical thinking skills involve evaluating the credibility of informational sources, connecting previous knowledge, and drawing conclusions. The general characteristics of critical thinking include being open to changes and innovations, being open-minded, and thinking analytically. The advantages of critical thinking comprise the ability to think freely and independently, avoid unthinking behaviour, and the ability to clearly state problems (Birgili 2015:74).

Rapitsenyane et al. (2022) argue that critical thinking, including analytical, communication, creative, open-minded, and problem-solving skills, is a key competency in the 21st century. Design sketching, through both manual and digital platforms, supports this critical thinking and creativity. Manual sketching remains widely used in design education and industry, but the future trend is towards a hybrid approach combining manual and digital methods for optimal cognitive development and benefits. The authors suggest revising the design

education curriculum to incorporate sketching topics with related art subjects for greater confidence and a positive attitude towards innovation and technology.

The key is finding a balance between technology integration and traditional art processes in the art classroom. Visual Arts education programmes can be re-modelled to incorporate technology such as development and sustenance of digital portfolios. This structure is regarded to promote art education by re-designing curriculum content and delivery and bring a paradigm shift on how learners might perceive themselves as capable, reflective and tech-savvy art educators (Baer & Danker 2017:2).

Virtual worlds are emerging as the new frontier in using ICT for the engagement of learners in primary, secondary and tertiary education. In 2010, using the virtual world, *Second Life*, was tried as a pedagogical tool in training visual arts education learners at the University of Atlántico (Jacka 2010). Faced with this scenario, the promotion of a virtual context to help learners become more competitive as they confront the various demands of today's society in their professional and personal lives (Morales 2011), promises a positive horizon. Here, it is necessary to promote initiatives aiming at improving the depth and generation of online knowledge in the application of appropriate pedagogical contexts for teachers to successfully reach their targets. This can be performed with a full understanding of teachers' attitudes, perceptions, and their use of ICT competencies to determine their influence on innovation processes among members of this professional group (Prendes, Gutiérrez & Castañeda 2010). In this context, to successfully implement reforms in the visual arts curriculum, the collaboration between visual arts education decision-making authorities and teachers, as main stakeholders, is imperative. To ensure reliable positive outcomes of the teaching/learning process, the interested parties should be well-aware of the relevant challenges and problems to creatively integrate the known with the unknown, the empirical with the innovative. Therefore, for developing a well-integrated pedagogical approach in artistic thinking and creating, "… proper knowledge and awareness … can be inspirational and motivational forces, both crucial factors in teaching and learning critical and creative thinking…" (Van Deventer & Steyn 2021:67).

The above viewpoints based primarily on identification, definition and analysis, illustrate a distinct severe educational problem. Characterised by its diachronic strength and socio-economic differentiation, the problem urges for further and meticulous research rather on the "how" than on the "what". To solve the problem pedagogically and successfully, we have

integrated two most powerful factors, the existing personal with the impersonal, electronical instrument; therefore, the most precious individual and collective factors. As such, education should consider and treat it as a tool to maximise its value if it serves the human brain since early age through proper pedagogical approaches.

2.3.8 Key technologies of computer multimedia

Mai (2019) outlines the following key technologies of computer multimedia to employ in the teaching and learning environment.

- **Streaming media technology:** The streaming media technology can realise streaming, and the animation, vocal music and other information are sent to the user through the server. The user can watch the video without waiting for the file to be completely downloaded, achieving the effect of downloading and viewing. In this way, the application of streaming media technology greatly reduces the user's time and improves the efficiency of media tools. Computer multimedia technology fully integrates the characteristics of computer technology interactivity and visualisation, bringing convenience to people's production and life.
- **Virtual reality technology:** Virtual reality technology is an integration technology. In the practical application of virtual reality technology, many disciplines are included, primarily involving artificial intelligence, computer graphics and human–computer interaction technologies. In some scenarios, by applying virtual reality technology, technicians can create a 3D virtual reality environment in a computer, and it can produce an immersive experience to people's work and life.
- **Video compression technology:** In the original compression coding technique, the event connotation and the subjective initiative of the receiver were not well considered, but only based on set theory. Therefore, the development of compression coding can be regarded as starting from information theory to step-by-step development, gradually improving the process. Predictive coding, wavelet coding and vector quantisation coding are all features of source statistics, combined with image transmission scene features, content-based division and image editing. Video compression technology is a content-based coding method, which is widely used in the current compression scenarios.
- **Multimedia database technology:** Under normal circumstances, the data of multimedia information is unformatted. When using this part of information data, it

is involving various difficulties, which brings inconvenience to using multimedia information data. Multimedia database technology can manage multimedia information data scientifically. After formatting and processing data, people can conveniently distinguish and apply the same type of information data in the process of using. In the process of promoting multimedia technology, it is possible to grasp the type and structure of information data more properly, providing security and scientific guarantee for the application of computer multimedia technology.

- **Audio technology:** The core content of audio technology is electroacoustic, which includes related technologies, such as architectural acoustics, physiological psychology, and music art. Combining sound and the electric conversion principle, applied acoustics, electronic technology and other disciplines supports audio technology, enabling audio technology to develop more flexibly.
- **Video on demand technology:** Video on demand technology combines technologies, such as television, computer and communication, to change the traditional video on demand method, enabling people to watch TV programmes more casually. After using video on demand technology, the traditional teaching mode has changed and the recognition of teachers through video on demand technology can make classroom teaching more interesting. The video server is the core of the video service system function implementation, providing a carrier for implementing video on demand technology and providing quality guarantee for video playback.

2.3.9 Software programmes for visual arts instruction

The increased use of computers and computer programmes in teaching visual art seems to have a positive impact in terms of valuable time saving, the simplification of instruction and the enhancement of the learning process. Furthermore, it helps the development of specific skills, including writing, communication, interaction, collaborative, critical thinking, and consciousness (Boyce 1999), while offering learners the necessary knowledge and practical experience required by the market (Thomas, et al. 1995).

Nowadays, learners can incorporate traditional methods with digital media using mobile devices—including ones they already own—to engage in learning activities at school and at home. Various software programmes is used for teaching visual arts, enabling the achievement of different teaching and learning goals. Using computers is not limited to using software but extends to accessing international learning materials. In the classroom,

instructors can use drone footage, mobile apps and programmes like Google Earth to bring outdoor environments inside; thus, bringing far away or inaccessible outdoor phenomena to all learners (Claiborne, Morrell, Bandy, Bruff, Smith, & Fedesco 2020). Beyond communicating at a national level, i.e., the classroom and school environment, the discourse either among school learners or higher-education students on international level becomes extremely productive through digital supported networks. Teachers might, for example, invite practicing artists from around the globe to display their work and interact with the learners (Neylon 1996; Henning 2000). With reference to visual arts, these fast and live planned discourses, can facilitate the exchange of ideas and shared challenges between different countries, continents, and cultures through a broader level of critical thinking. To support this statement, I will refer to a case on international collaboration between two continents, Africa and Europe, demonstrating the potential of technology when properly guided by the human ability to create, express, and campaign about human rights issues.

Due to the COVID-19 pandemic, the Aristotle University of Thessaloniki, Greece, and the University of Pretoria were forced to continue their agreed collaboration through distance communication (Steyn, Proios, & Molepo 2021). Faced by unfamiliar circumstances, both parties, lecturers and students, had to think creatively, seek solutions and expose their artworks to external, foreign judgement. Despite their geographic distance, language and cultural differences, these students could connect through technology using Zoom. Invited to visually express their ideas and raise their voices on the theme, Banners for Freedom, the students challenged their human emotions and intelligence to maximum capacity by skilfully employing technology. The online intercultural collaboration between the two departments resulted in three highly successful exhibitions in Greece and in South Africa. The above is an excellent example of how one could move from the tangible traditional face-to-face teaching approach to an online pedagogical approach. Students felt included through a) sharing the global pandemic constrictions and b) through group participation.

The World Wide web also provides a virtual international gallery for learners' work (Loveless 2003). As digital media is expanding, new career opportunities are opening for visual artists, where learners with knowledge, skills, and proficiency in digital art and design can be employed in commercial visual arts and design services, such as advertising, film, animation and other computer graphic industries (Matthews 1997; Taylor 1999). Web 2.0 technologies, such as Second Life, Flickr and the games industry, provide opportunities for self-expression

and commercial potential, encouraging learners to be more resourceful and develop their entrepreneurial skills.

The traditional way of teaching using notes, slides and books can be enhanced by tools drawn from the virtual learning environment (web-based learning environment). The web-based learning environment is defined as the technology that uses the internet as a tool to support and promote learning Today, it is used as the only tool in distance teaching or as a supplementary means to traditional teaching (Basioudis & De Lange 2009). According to Basioudis and De Lange (2009), the virtual learning environment includes the following features:

- Most learning programmes are internet-centred (learning begins and ends on the internet), each course has its own websites, and students are responsible for internet access.
- Most learning programmes have many interactions between teachers and learners, among learners, and between learners and other sources.
- Most learning programmes are based primarily on access to human and material resources that is possible through the internet, only (interactive television for tele-education).

Academic institutions globally have invested time and money on introducing ICT in education. The technological development of the media provided the base of transforming the face-to-face education to distance learning (Bryant & Hunting 2000). Distance learning is the result of the evolution of interactive media and technology and has broad applications in the teaching of different disciplines (Halabi et al. 2002; Bryant & Hunton 2009). Tele-education includes using interactive telecommunication to conduct teaching and distance learning (Halabi 2005). Web technology in general and IT were adopted primarily by tutors participating in programmes frequently offered to widely dispersed student populations. These tools allowed the spreading of knowledge and the cultivation of learning among adults based far (geographically and temporally) from the tutors (Atkinson et al. 1996; Wade 1999; Liaw & Huang 2000). ICT seemed to attract people involved with the traditional (face-to-face teaching) because the tools proved to be ideal for teaching within a digital context.

According to Padmavathi (2017), teacher training in India has been focusing on preparing teachers for using innovative teaching aids appropriate to the content and based on one's

imagination and creativity. Apart from the traditional educational technology, such as charts, models and overhead projectors, teacher training colleges are trying to introduce computers to train teachers for computer-based teaching and learning. This use of technology has become a vital part of the learning process in and out of the class.

In the information age, where new knowledge is being added continuously, an urgent need arises for teachers to focus on improving their content knowledge and remain updated. Only then can they answer the learners and guide them in meaningful discussions in the classroom. Learners have enormous information at their disposal. Presenting the facts is not the teacher's responsibility anymore—the teachers' role is how to make children understand and use the information available constructively (Padmavathi 2017).

With the advent of the innovative technologies, there is a shift in the method of content transaction. Presently, learners come to the classroom with a load of information collected from various sources. According to Brode (2005:7), there are several purposes for getting learners on the information worldwide computer network, including:

- Real-world examples of integrated knowledge
- Facilitates collaborative learning
- All about communicating
- Caters to different learners in diverse ways
- A cultural, racially, physically, sexually blind medium (Williams 1996:22- 24)

Technology in the art studio is a unique way to get learners to use other types of work media and techniques. Learners can use several apps to create their art and manipulate the traditional creative art approach they have acquired. Such apps are easily available online, which teachers and learners can install on their technological devices, such as mobile phones, laptops and personal computers. To enhance their teaching and learning approaches to their artworks of design process, learners can employ any or a combination of the following applications:

Aviary, Paper 53, KaleidaCam, PicsArt, Procreate, Doodle Art and Green Screen

Aviary, for example, is a photo-editing application that allows using numerous effects creating angles onto one's photographs from an intuitive interface that is quite simple to work with. Aviary is an interesting and distinctive tool by which one can manipulate photographic material by retouching them to professionally produce a work of a higher quality. Like most

in this category, the Aviary application permits one to add elements, such as a suitable text or small decorative images, balance and adjust the photo's colour, retouch brightness and contrast, sharpen and blur any part of the photograph, and apply the desirable filters and effects. One could have 12 different *Instagram* style effects at one's disposal to give the pictures a sophisticated and innovative touch. If one adds to this the result of the other editing tools, one could end with truly spectacular photos or suitable source material for preparing the final artwork. As such, the Aviary app can assist learners to design posters, flyers and manipulate photos.

Paper 53 is an app that could lead to impressive results by combining drawings, notes, photos and sketches. Available on the Appstore, this app is simple and user-friendly. By using one's finger (or a stylus) a learner can draw, paint, select colours, erase and develop their creativity in various ways (Edtech 4 Beginners 2016). The important benefit about Paper 53 is that one can choose to export the drawings with a transparent background—a huge plus point for people who want to place their doodles on top of images, photos and textures outside of the Paper 53 app. It is also a great facilitator to quickly add handwriting and doodles on top of photos or other images and is applicable when learners plan their creative process or work on their drawings.

KaleidaCam is a fun and straightforward app from Dapper Owl, which turns an iPhone into an electronic kaleidoscope by creating repeated shapes or patterns (https://www.kaleidacam.com). New patterns and shapes emerge with the slightest movement of the iPhone, giving an abstract view of everyday things. According to theappwhisper.com (2022), KaleidaCam is easy to use because with a single setting, it allows one to alter the pattern's number of sides. By splitting images into reflected wedges, this minimalist app creates an infinite number of beautiful patterns with even the plainest looking objects.

From a social media viewpoint, through KaleidaCam, one can create high-quality pictures that can conveniently be shared via the application's library on Twitter, Facebook and other social communication platforms. KaleidaCam, makes a kaleidoscopic version of one's image because when using the camera (by default), it gives a live view of how an image is broken up and mirrored. Across the top of the screen are controls for aspect ratio (square or rectangular), camera or library, front or rear camera, and other suitable settings. At the bottom are gallery, shutter and kaleidoscope type. One can choose to save all images captured to the camera roll, the internal KaleidaCam gallery or both because users are not limited to taking

pictures with KaleidaCam. This application can also manipulate images from photo albums. By tapping the landscape button at the top middle, users will be driven into their library. Instead of moving the camera slightly to achieve different looks, as when capturing an image, one can drag the finger across the screen to change the look of the image through the camera roll.

According to Forbes (2021), Picsart is an online photo and video editing application, with a social creative community. The platform allows users to take and edit pictures and videos, draw with layers, and share the images on Picsart and other social networks. It is one of the world's most popular apps, with reportedly more than one billion downloads across 180 countries (Picsart Tech's Newest Unicorn 2021). Picsart has developed four mobile apps and a set of web browser tools for editing videos and photos. The app and website tools support social networking activities. The four apps include:

- **Picsart photo and video editor:** a photo and video editing app with tools to add filters and various effects, with social network integration. The app is free to use and offers in-app purchases of stickers and other graphic elements (Portero 2022)
- **Picsart animator:** an animation app allowing the creation of cartoon videos, GIFS and other animation (Saleem 2001)
- **Picsart colour:** a drawing and painting app (Graham 2014)
- **Picsart GIF and sticker maker:** an animated GIF and sticker generator (San Jose 2016)

The apps are available on iOS, Android and Windows mobile devices (Portero 2022). Picsart's web browser tools for personal computers have the same features as the Picsart photo and video app but are designed for web browsers on personal computers running Windows 8.1 or higher (Portero 2022). Built-in social networking features with the apps and website tools allow users to comment, favourite and follow others using the tools (San Jose 2016).

Procreate is a graphic design application that allows users to sketch and paint using their mobile devices (procreate.art). It is a pocket-friendly app packed with all the tools needed by digital artists. It gives users access to hundreds of brushes that fit about any creation you could have in mind. With this, you can stick with basic sketching or try inking, drawing, and painting. Under each brush category, you will find more options to customise them further.

When it comes to design apps, users often look to Photoshop or Illustrator. It is still a better option for complex illustrations and everything requiring a grid structure (domestika.org). However, if you are looking for simple sketching, flat illustrations, and everything you can create on the go, Procreate is a good option. Instead of a blank canvas, it gives you access to brushes you can try for various type of creative design (adventureswithart.com).

Each brush category comes with options. You can use different textures and play with different parameters to create a unique brush. You can download ones made by other users (pinterest.com). Moreover, you can import your Photoshop brushes, and with this, if you have a particular set on your computer, you can continue working with them in Procreate.

Procreate also offers a smoother workflow. You can zoom in and out and even rotate your canvas without lagging. Additionally, it comes with a time-lapse recording, so you can record your workflow and analyse it afterward. The design tool also works with various formats. However, the app still lacks some photo-editing features. There are no vectors, and you cannot adjust the layer settings. Moreover, the masks are still basic, meaning you cannot invert them or detach them from the layer (blueskygraphics.co.uk).

Procreate is a handy application for artists and comes with a decent selection of sketch and painting tools to visualise your ideas. Also, it is intuitive compared to professional tools. But as with every new software, you need some time to adapt to it and learn some shortcuts. It also does not offer many advanced editing features for complex illustrations. For simple sketching and doodling, however, this app is worth a try.

According to Softonic International (2022), Procreate has the following prospects

- Intuitive interface
- Hundreds of customisable brushes
- Can import brushes from other apps
- Smooth workflow

CorelDraw is one of the most popular and powerful graphics programmes and gives designers a most rewarding and enjoyable work experience. It is built and designed to meet the daily demands of working designers. CorelDraw software is available in the market, and once loaded onto the computer, you can get started with your designing work.

CorelDraw is a powerful and capable graphic design app that offers unique tools and collaboration features for creative workflows (www.coreldraw.com). The software is a photo-editing and graphic designing solution that helps businesses across marketing, manufacturing, automotive, printing and other industries create designs and edit digital images. The application enables professionals to create vector images, automate workflows and manage typography.

CorelDraw lets designers create and access digital artwork, web graphics and prints and store them in a centralised repository. Using integrated vector illustration tools, users can design art from basic lines or shapes and add custom effects, such as contours, mesh fills and blends, to vector images. Additionally, it allows organisations to configure layouts for brochures and documents and manage image retouching operations. CorelDraw lets learners convert raw files into various formats, such as PDF, JPG, and PNG. The application is available to users on a perpetual licence basis and monthly or annual subscriptions. Support is extended via documentation, video tutorials and other online measures. CorelDraw is for vector drawing, editing and layout. It is a global favourite, with predominant appeal to the apparel, garment and textile industries. Formerly, the app was only for Windows, but now that it is available to mac OS users, and its audience is expanding. Corel Draw gave users the flexibility to design anything one's imagination could conceive. All tools give the right effect in the right precision for whatever concept users dream of bringing to reality, and with ease. The ability to edit a document-like design in a document environment, such as MS-word, is one of the best experiences for designing a corporate letter headed document. It ensures you maintain document formatting of the originally typed text.

The software comes with a versatility that will satisfy any creative need. It is an all-in-one graphic design suite for vector illustration, page layout, photo editing, font management and so much more. The feature CorelDraw is known for its ease of use and intuitive interface. They were the first to launch a version allowing multiple pages in the same file or creating forms by dragging the mouse. Today, this virtue is maintained, it can work very well, and with a good integration with other applications and prepress and printing processes, and with the possibility of exporting to almost any format in the graphic environment, very well covering the requirements that can be asked of a programme like this.

According to Corel Inc (2012), Corel Photo-Paint is a raster graphics editor developed and marketed by Corel since 1992. Corel markets the software for Windows and Mac OS

operating systems, previously having marketed versions for Linux (Corel Photo-Paint 9 for Linux; FreeOS.com) (Version 9). Its primary market competitor is Adobe Photoshop. In 2006, Corel released version 13 as Photo-Paint X3, employing this naming convention for subsequent releases and CorelDraw, included with Photo-Paint in the CorelDraw Graphics Suite. The current version is Photo-Paint 2020 (Corel Inc. 2012.). Corel has marketed a limited edition of Photo-Paint called Corel Photo-Paint SELECT with HP scanning hardware, e.g., the HP ScanJet 5p scanners.

Photo-Paint's native format is Corel Photo-Paint Image, which stores image data and the information within an image, including objects (layers in some raster editors), colour profiles, text, transparency and effect filters. The programme can open and convert vector formats from CorelDraw and Adobe Illustrator and can open other formats, including PNG, JPG and GIF files, as well as competing photo editor formats from Photoshop, GIMP and Paint Shop Pro (the latter is also a Corel product). The programme also supports plug-in functionality, including those developed for Adobe Photoshop (Namesuppressed.com 2016) and Paint Shop Pro. Other extensions, such as brushes, are also compatible with Photo-Paint.

Corel Photo-Paint X6–X7 supports OpenType font features. With the X7 Update 4, the Font List, a new additional feature, allows for filtering type fonts by weight, width, supported scripts, font technology, character range and style.

As other raster graphics editors, Corel Photo-Paint allows an image to be edited in multiple layers called objects. A gradient line going from opaque to transparent, for instance, can be used to have a darker foreground colour fade into a lighter background colour. The user interface is highly customisable, and the user can freely move dialogues or adjust button sizes. Effects can be applied to a picture, including SMART Blur—a type of Gaussian blur effect that retains sharpness around sharper edges—Mesh Warp, Camera Lens Flare, Trace Contour and others. There is limited support for vector paths to be integrated. Depending on personal preferences and work style, users might prefer Corel Photo-Paint over Adobe Photoshop or the other way around; however, in terms of market share, Photoshop is more represented.

As a component of the CorelDraw Graphics Suite, Photo-Paint can exchange data with other programmes in the suite, including Corel Connect (Version X5 - X7), enabling users to share files between different computer software and drives on the user's computer. CorelDraw and Photo-Paint are copy-paste compatible, with format and effects retention, and without file conversion.

Adobe Photoshop is a vital professional software manufactured and developed by Adobe Systems Inc. It is a well-known leading photo-editing software, including various standard filters, effects and an advanced variety of editing applications (George 2015). It is used for image printing, editing, add effects and designing via some innovate tools that have a deep impact on designs and projects (www.businessdictionary.com; Adobe Systems Inc. 2005).

According to Sayer and Medford (2000), Adobe Photoshop was originally created by Thomas and John Knoll. Photoshop is primarily used for photo editing, but one can make many types of graphics. Adobe Photoshop is designed for Mac (OS) and Windows. In Photoshop, the file saving format is.PSD or PSB. Photoshop has several colour modals, such as RGB, CMYK, Grayscale, Bitmap and lab. One can edit vector graphics and 3D graphics and videos. Its features can be set and expanded by plug-ins programmes. Photoshop is available in 26 languages, and you can make user interface and user Xchange designs. Photoshop was bundled with much software, such as Adobe Image Ready, Adobe fireworks, Adobe Bridge and Adobe Camera Raw. Photoshop was initially released on 18 February 1988. This Software's platform is 64 or 32. Like Photoshop, Adobe Company also develops and publishes Photoshop elements, Photoshop light room, Photoshop Express, Photoshop Sketch and Photoshop fix. In this software, we work on layers, paths and channels, but primarily on layers. Photoshop 1.0 was released on 19 February 1990 only for Mac OS(X). When Photoshop 1.0 was released, it used to cost around $300 an hour for basic photo editing (https://en.wikipedia.org/wiki/Adobe_Photoshop).

Photoshop file format is.PSD, which stands for Photoshop document. Photoshop files store images in PSD files and include layers with masks, opacity (transparency), text, alpha channels, spot colours, clipping mask and duo tone settings. Photoshop supports many image file formats (jpg, jpeg, tiff, gif, png), vector formats (pdf, eps, svg), portable bitmap, Targa, Pixar (pxr) and WBMP. Photoshop files have a maximum width and height of 30,000 pixels and length limit of 2 GB (https://www.photoshopessentials.com).

Adobe Illustrator is a vector graphics editor and design programme developed and marketed by Adobe Inc. Originally designed for the Apple Macintosh, the development of Adobe Illustrator began in 1985 (www.adobe.com/products/illustrator.html). Along with Creative Cloud (Adobe's shift to monthly or annual subscription service delivered over the Internet), Illustrator CC was released. The latest version, Illustrator 2022, was released on 26 October

2021 and is the 25th generation in the product line. Adobe Illustrator was reviewed as the best vector graphics editing programme in 2018 by PC Magazine.

Illustrator Draw is a free-form vector drawing app for Android and iOS users (Adobe Creative Cloud 2014). Along with Illustrator, it is currently marketed by Adobe through Creative Cloud. Drawings made using the Illustrator Draw app can be exported to Adobe Illustrator's desktop programmes. A sidebar appears at the left of the screen, with various tools to select, create and manipulate objects or artworks in Illustrator. These tools can be selected as following: drawing, typing, painting, reshaping, slicing and cutting, symbolism, moving, zooming and graph (Pieters 2006). Some tools have a small triangle at the bottom right of the toolbox icon, providing the option to view or expand some hidden tools by holding down the mouse button on the triangle (Stone 2005).

Some examples of basic tools in Illustrator are selection, paintbrush, pen and pencil tools. Selection tools are used to layout, adjust, and organise the artwork by selecting, positioning and stacking objects accurately. Moreover, selection tools can group, lock or hide, and measure objects (Federal Trade Commission Decisions, Complaint 2010.). Paintbrush tools can be used to modify the appearance of the artwork and include calligraphic, scatter, art, pattern and bristle (FreeHand Firsts 2011). Pen tools create straight and curved lines for the artwork and can add anchor points to paths and delete from paths. Pencil tools allow the user to draw and edit freehand lines.

2.3.10 Conclusions

It is important to identify which skills are promoted by the Fourth Industrial Revolution. Also, understanding what and why the current education system in Ghana requires a metamorphosis from Science-Technology-Engineering-Mathematic (STEM) to Science-Technology-Engineering-Arts-Mathematics (STEAM) is essential. Such a shift from one to the other approach can purposefully develop a learner to be future-ready citizen and professionally well equipped with 21st-century skills. The sustained interest in implementing STEAM led to the firm conviction of the NAEA that including a comprehensive arts education will help upcoming STEAM professionals (NAEA 2017, cited in Strycker 2020:2). Hence, the vision for education in Ghana, specifically for visual arts and design, could be to educate 21st-century learners to be multi-culturally equipped and problem-solvers capable to transform

pedagogy through the practice of technology inspired by the African *Ubuntu* humanistic principles.

The amount of literature reviewed based on what other authorities have written about the topic under study will pave the way for the study. The reviewed will assist in discovering more findings to add to the existing ones. To develop a well-focused argument in favour of a balanced integration, my information will be based on relevant studies and my critical evaluation will be guided by a substantiated theoretical framework (Taylor & Procter 2001; Creswell 2012), presented in the next chapter.

CHAPTER 3

THEORETICAL FRAMEWORK

3.1 Introduction

In continuation of my literature review, this chapter will focus on the theoretical framework to support and guide my research on the pedagogical role of technology in visual arts teaching and learning processes. To substantiate my research viewpoint, method and line of reasoning, my conceptual framing combines established theories and philosophical thoughts in the context of the African collective worldview and relevant to pedagogical, instructive discourses.

According to Nazaro (2012), the theoretical framework is more formal and based on established theories that typically come from other disciplines, such as anthropology, economics and social sciences, and are used by historians and educationists (in our case, art educationists) to bring new dimensions of the topic to light. Importantly, there is no correct or incorrect theoretical framework to use when examining a topic because each topic can be viewed from various viewpoints. As for qualitative research methods, Anfara and Mertz (2006) propose that experienced researchers and students applying them often have trouble identifying and using theoretical frameworks in their research. This trouble is typically centred on finding a theoretical framework and understanding its pervasive effects on the process of conducting qualitative research.

Therefore, this study presents the relevant theoretical views that define and substantiate my conceptual thinking behind my research methodology, my approach and rationale regarding the application of TPACK system in the Ghanaian sociocultural context and needs.

3.2 Humanism versus automation

Ubuntu is a Zulu and Xhosa word, two languages spoken in South Africa, which can be roughly translated as humanity towards others. According to Wright and Jayawickrama (2021), the term *Ubuntu* is derived from a Nguni (isiZulu) aphorism, *Umuntu Ngumuntu Ngabantu*, which means a person is a person because of/or through others (Tutu 2004:25-26; Moloketi 2009:243).

Though interpreted differently, depending on each country's indigenous cultural factors in terms of language, religion and collective historical memory, this typical African philosophy ideally permeates all African cultures of the people on the continent. In a traditional Ghanaian home, for instance, it is expressed through a strong belief that when food is prepared, it should be enough to the extent that when a visitor suddenly or a stranger arrives, there should be enough food left to treat the guest. In Ghana, according to the general concept of *sharing*, the produce of one's farm does not entirely belong to one person, but to anybody who happens to be passing and, if hungry, they may pluck some of the crops or fruits, provided not greedily by taking more than what is needed, but as permissible because of *humanity* towards one another. In the spirit of sharing, thus, the same fruit is brought back to your cottage for all to share and enjoy.

Therefore, in the African worldview, Ubuntu can be interpreted as the capacity to express compassion, reciprocity, dignity, humanity and mutuality. As a traditional African concept, thus, Ubuntu embodies all those virtues that ideally should maintain social harmony through the spirit of sharing. Socially, due to their collective appeal, these shared principles also function in the interest of building and maintaining justice among communities through mutual caring (Tutu 1999:34-35; Luhabe 2002:103; Khoza 2006:6; Mandela 2006: xxv).

3.3 Humanity versus technology

Technology might be commonly understood as a human-made, tool-like resource. However, in popular discourse, the development of technology is depicted as an inevitable process that evolves independently from humans, with a nature of its own occurring outside of being a human. This type of cultural construct affords conceptualisations of technology as an autonomous force affecting people. The impact depends on whether technology is treated neutrally as a tool for some purposeful use or as a non-neutral force always affecting society regardless of its proposed uses (Savat 2012:2).

Technologisation and digitalisation are often treated as either detrimental or advantageous to our natural human abilities, or it is seen as something we must get hold of to keep up with the changing world (Van der Schyff & Schiavio 2017; UNICEF 2019). At one end of the scale, technology could be seen as a threat to natural ways of being and acting human, or a power that we cannot control. At the other end, it can be seen as a promise of a new type of humanity, transcending the limits set by our biological bodies and fallible human intelligence. In terms

of the evolutionary continuum, technology has been an integral part of the development of humanity for so long and fundamentally that it is challenging to conceive a world and humanity without technology (Ihde 1990). Technology (or technics) constitutes essential characteristics of humans, and it is possible to argue that humans "are essentially defined as prosthetic beings", meaning that the boundaries of humans in relation to technologies are not fixed but "both plastic and vulnerable" (De Preester & Tsakiris 2009:308).

3.4 Human–technology

Inspired by biology (Licklider 1960), the man–computer symbiosis notion has been used as a starting point, through which the two symbionts, human and technology, should benefit mutually due to their close relationship. This relation's aim is to mix the best of human and the best of technology to enhance human cognitive capacities. For Licklider, users will prefer symbiotic systems amplifying their capacities. Regarding education, a great deal of discussions have emerged asking how technology has transformed or will transform the ways of teaching and learning (Gouzouasis & Bakan 2011).

In the context of education, discussions about technology are frequently framed by a political rhetoric of educational reform using terms such as transformation, radical reform, modernisation, and irreversible change (Purves 2018:144). Simultaneously, talks of under-digitalised schools depict current educational practices, in many ways, as old-fashioned regarding modern technology use (Apple 2008:244; Parviainen 2015:5). This view posits the necessity of harnessing the emerging power of technologisation, whether it be a more efficient way of learning, more efficient or less costly way of organising education, or just keeping education up to date with the changing world, providing learners with the skills they need in a technologised society and working environments. According to Purves (2018:144), "teachers (perhaps more so than colleagues in many other subject areas) have faced exhortations to re-equip, re-skill, and re-consider practice in the light of large-scale technological developments". Moreover, an understanding of technology and its impact on music-making "has become vital to the success of the twenty-first-century musician" and might even be considered as a new core discipline within music education curricula (King 2018:164).

3.4.1 Human–technology relationship

So far, the human–technology relationship has primarily been studied statically, focusing on a short lapse of time situated in the initial usage phase. Even so, the necessarily dynamic and constructed aspects of the relationship to technology have been underlined (Dillon 1987; Morris 1996; Bhattacherjee 2001). In this range of studies examining the importance of temporality in the development of the relationship with technology, this research shows that a short lapse of time is insufficient to study the relationship that grows with technology because it is a process occurring over a long period.

3.4.2 General human–technology

Things are constantly changing in the world. Natural concepts of humanity are going to change. Our bodies will be so high-tech that we would not be able to distinguish between what is natural and artificial. Inside one's head is a complex arrangement of matters in the known universe. One can ask, can we become superhumans? The regional revolution discovery was that we can use steam engines to do different things, such as electrical computers in communication technology. We are now in the initial stages of the Fourth Industrial Revolution, which is bringing together digital, physical and biological systems. One of the features of the Fourth Industrial Revolution is that it does not change what we are doing but it changes us. For example, one can use a black box to visualise the brain's activity; it helps us to identifying and also helps us assess ourselves. It is a way to unmark the black box and truly identify what is inspirational. There is no scientific foundation for the effect of phones on our brains and geno- and biological ageing. The potential for new renal cells to restructure themselves to relationship, work, planet and life emphasises the need for a different technology model to shift the system. By switching to a new system, we will be able to satisfy the fundamental requirements of every human being on the world and concentrate on our main objective—improving human welfare—rather than on economic growth.

3.5 Theoretical and conceptual framing

The best way to understand how teachers can practice ICT in their classrooms is by focusing on relevant information on how to integrate technology with other familiar approaches in education. Many views expressed by visual arts teachers and ICT experts suggest that any proposed framework for ICT integration into visual arts should be liberal enough to make teachers key players in its adoption and implementation. This is a vital issue of flexibility

and initiative in teaching–learning interactions, and ICT consideration can be appropriately included in the ICT modules, as indicated in this framework.

3.5.1 Connectivism

Considering the fast progress of technology, Siemens (2005) claims that connectivism is a more contemporary and relevant learning theory to meet the rapid speed of change. Expanded expertise knowledge requires continuous learning (and unlearning) on top of the amount of lifelong information. This overwhelming amount of streaming information can no longer be assimilated and preserved within a single individual's mind but is now better stored and processed by technology. This approach is like Vygotsky's (1962) fundamental social constructivist theory, which involves learning, attention and problem solving through a network participation where the intellectual activity is a process of linking and creating a mental and physical network. This network enables the 'know where' to find the needed information to assist those of 'know-how' to substantiate other learning systems through the mental ability to connect (Howell 2012:28). In the context of being constantly connected through Internet networks, one has access to uncountable information sources and powerful tools to share, assess, accept, reject, assimilate and reproduce knowledge. This "synchronous and asynchronous learning" is acquired through connectivism (Siemens 2008)[1]. Connectivism, in other words, is a theoretical framework for understanding learning in a digital age. Connectivism underscores how internet technologies (web browsers and other search engines) contribute to innovative approaches of learning.

As connectivism affects various aspects of life, I will focus only on its impact on learning. In this context, my study will be supported by

a) the PCK promoted by Shulman (1986) and
b) the TPACK, a model developed by Koehler and Mishra (2006).

3.5.2 From PCK to TPACK

Developed by Schulman (1986), PCK shows the interplay occurring between content and pedagogy that makes subject content understandable to learners. It comprises a

[1] Siemens, G. (2008). Learning and knowing in networks: Changing roles for educators and designers. Article presented to ITFORUM. Retrieved from http://itforum.coe.uga.edu/Paper105/Siemens.pdf. 20 June 2021.

comprehension of what renders the subject content either complex or simple to understand. This applies to the ability to adopt a pedagogy that connects with the demands of effective teaching. However, 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") to make it easier to remember and form a more integrated whole for the three types of knowledge addressed: technology, pedagogy, and content (Thompson & Mishra 2007; 2008). The TPACK framework builds on Shulman's construct of knowledge centred around PCK to include technology knowledge as situated within content and pedagogical knowledge. As Mishra (2019:76) states, the TPACK framework describes the types of required knowledge for teachers to possess to successfully integrate technology in their teaching approaches.

Although the term is new, the concept of TPACK has been around for a while. A precursor to the TPCK idea was a brief mention of the triad of content, theory (as opposed to pedagogy), and technology (Mishra 1998) within the context of educational software design. Pierson (1999; 2001), Keating and Evans (2001) and Zhao (2003) similarly describe the relationships between technology, content and pedagogy. Other researchers have addressed similar ideas, although often under different labelling schemes, such as integration literacy (Gunter & Bumbach 2004), ICT-related PCK (Angeli & Valanides 2005); technological content knowledge (Slough & Connell 2006), and electronic PCK or e-PCK (Franklin 2004; Irving 2006). Others who have demonstrated a sensitivity to the relationships between content, pedagogy and technology include Margerum-Leys and Marx (2002), Hughes (2004), McCrory (2004), and Slough and Connell (2006).

According to the TPACK framework, specific technological tools (hardware, software, applications, associated information literacy practices) are best used to instruct and guide learners toward a better, more robust understanding of the subject matter. Its application emphasises "how the connections amongst teachers' understanding of content, pedagogy, and technology interact with one another to produce effective teaching" (Koehler & Mishra 2013:101). Thus, the TPACK is the heart of good teaching and describes the types of knowledge needed by a teacher for effective technology integration in the teaching and learning, in this case, visual arts (Mishra 2019:76). However, connectivism is a theoretical framework for understanding learning in a digital age because it underscores how internet

technologies (web browsers and other search engines) contribute to new learning approaches.

3.5.3 Connectivism in visual arts

The theory of connectivism is close to the contemporary understanding of the visual arts education content, particularly in Ghana because the emphasis on the learning process addresses the learner's self-initiative and, thus, the acquisition of learners' experiences (Tomljenović & Vorkapić (2020). Constructivism in visual arts classes. Center for Educational Policy Studies Journal, 10(4), 13-32 Simspon 1996; Herzog 2008; Thompson 2015; Wiggins 2015). This is especially evident even before learning the content of visual arts because learners have specific acquired ideas about the visual world around them. An interpretative activity in constructing understanding is especially pronounced in visual arts education because the appreciation of artworks in Ghana and the creative representation of learners are subjective and individual interpretations of the learned and experienced content. When teaching, the teacher must have no preconceived notions about an appropriate way of solving visual art problems, but rather develop a sensibility for the learners' various artistic solutions, remain open to new and different ideas, discuss them with the learners, and try to understand their ways of perception. In doing so, the teacher will gain insight into the learners' mode and style of cognition, their cognitive abilities, attitudes and beliefs, and the areas that the learners must develop. This knowledge is the basis for further selection and preparation of the teaching process and visual arts tasks. Consequently, appropriately "designed visual arts problems" as stated by Tomljenović and Vorkapić (2020:18), "should provide a cognitive challenge to reach the higher level of students' understanding" and ingenuity that are needed to solve the related task problems.

Connectivism integrates specific principles for any individual member of any society to adapt to the new electronic way of generating knowledge, which is easily accessed in terms of time and space. Characterised as chaotic and extraordinarily complex, this knowledge can be constructed through a network best experienced and most productive when shared, especially during learning processes in a class. In connectivism, this network, through its interconnecting net-strings, facilitates the acquiring of knowledge through a process of streaming information between seemingly disparate pieces of data to form a more complete comprehension of a specific subject. To facilitate continual learning, nurturing and maintaining connections is essential and highly needed, while the ability to anticipate connections between fields, ideas

and concepts has become a core skill.

Furthermore, according to Verhagen (2006) as cited in Williams (2008), connectivism is not simply a learning theoretical approach, but a pedagogical theory. For Giesbrecht (2007), connectivism presents itself as a pedagogical concept affording learners, especially visual arts learners, the ability to connect to each other via social networking or collaboration tools. Siemens (in Giesbrecht 2007) states that the educator's role is to create learning ecologies, shape communities and release learners into the environment. Giesbrecht (2007) stresses some limitations about course environments, which are represented as one viewpoint of a subject and presented in isolation. Furthermore, Giesbrecht (2007) highlights that connectivism is founded in connections where visual arts learners should interact with elements that extend the learning practice beyond the classroom and allow real-life experiences. Under the connectivism principles, education is holistic, where balance between learner needs and institutional needs is essential. Spencer (2004) mentions some positive aspects of using technology and expresses that ideas and discussions among learners can continue beyond the classroom meeting time, dialogical participation is encouraged, and learners gain new options for participating.

In connectivism, flexible learning is an option available for those who cannot attend classes to learn through formal and organised programmes to effectively complete their work. Due to location communication difficulties or lack of family assistance because of other commitments, this way of learning can assist learners effectively and properly. In another field, employers can use connectivism without spending a significant amount of time due to the application of ongoing educational and training programmes for their employees.

Connectivism has a significant role to play in learning to learn, as learners can acquire knowledge more effectively and become learned individuals for life by applying their initiative and capacity to bear the consequences of their choices. Furthermore, the theoretical context of connectivism can guide individuals to responsibly decide what to look for, how to obtain it, and how to embed the needed information in their empirical knowledge banking system for immediate or future use. I believe, if learners exercise their personal initiative to decide how they prefer to learn and evaluate their learning strengths, they will be capable to motivate themselves and have the self-confidence to set and pursue their goals. This innovative, away from compulsory, approach to teaching and learning processes I believe, can improve learners' memory, stimulate their self-esteem and develop their critical thinking

in making sense of the available, plethora and complex information. Connectivism, thus, should be considered as the closest theoretical framework to approach and conceptualise the potential of the educational role of technology.

To apply the connectivism learning theory into visual arts education in Ghana, instructional consideration must be given to the physical classroom space, and a rationale for deciding to meet in a face-to-face environment. Many theories put forward recently are meant to be used to explain the happenings and problems in formal education environments. However, participants regard connectivism as a proper approach to explore informal learning but not enough in itself to explore everything involved in learning. Although the connectivism learning theory is frequently referred to as a networked structure of learning, it is about more than only the technology used to achieve the result. It can be seen as a networked construct encompassing neural, conceptive and external processes. While neural and conceptive processes occur within the individual, technology is the only external construct that lends itself to the learning process as a tool, not as a terrifying, dominant, faceless threatening factor.

As a productive approach to many of the dilemmas teachers face in implementing educational technology in their classrooms, Koehler and Mishra (2013) have illustrated the TPACK through three interlinked components:

a. Content knowledge (CK)
b. Pedagogical knowledge (PK)
c. Technological knowledge (TK)

The first aspect of the major knowledge is CK, which is the subject matter knowledge to be taught and learned (Koehler & Mishra 2005, cited Muianga 2019:39). The second aspect of the model is PK, which refers to the processes, procedures and methods used in teaching and learning (Koehler & Mishra 2005, cited in Muianga 2019:39). TK is the third aspect of the model, encapsulating an understanding of how to apply modern technologies with traditional technologies for teaching and learning. The interactions between these three major knowledge areas further develops four other knowledge areas.

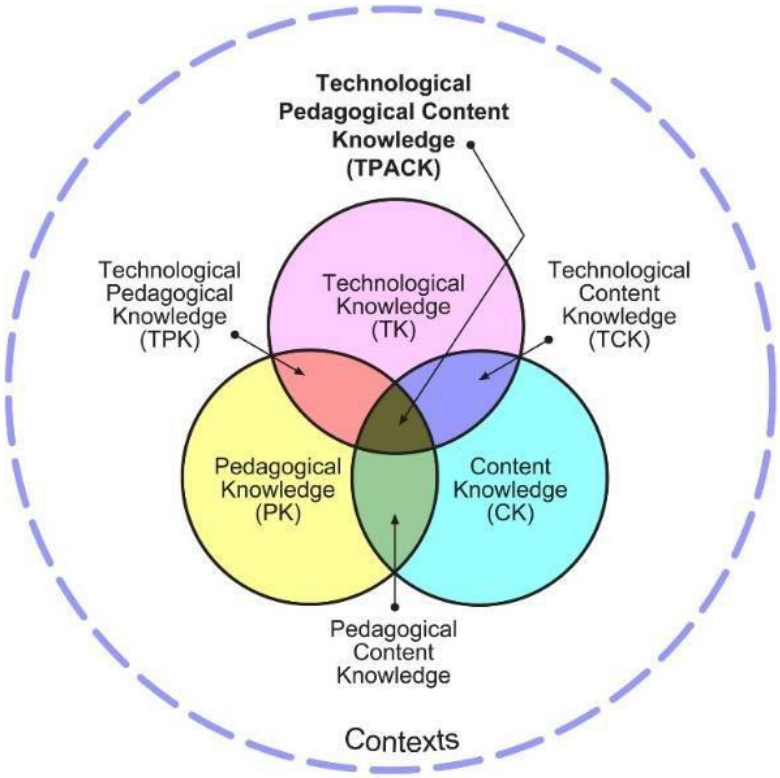

Figure 3.1 Conceptualisation of TPACK framework

(Reproduced by permission of the publisher © 2012 by tpack.org)

a) **CK** is the "knowledge about an actual subject matter that is to be learned or taught" (Mishra & Koehler 2006:1026). Teachers must know about the content they are going to teach and how the nature of knowledge differs in various content areas. It deals with the teachers' acquired knowledge about their teaching content, which is professionally essential because it refers to the concepts, theories, ideas, understanding of suggestions and supporting their teaching subject. Teachers should understand the deepened information of the subject they deliver (Koehler, Mishra, Kereluik, & Shin 2014).

b) **PK** refers to teachers' understanding of how to transmit the content of their knowledge in class and their understanding of how learners should learn best to meet their learning needs. PK similarly refers to the methods and processes of teaching and includes knowledge in classroom management, assessment, lesson plan development, and student learning. PK involves a diverse range of methods to deliver the subject taught and make learners understand. Teachers with a deep knowledge of pedagogy understand how learners construct knowledge and conceptually acquire skills (Koehler et al. 2014).

c) **TK** stands for the teachers' integrated knowledge about old and innovative technologies they should apply in class to make meaning of their subject. TK, thus, refers to the knowledge about various technologies, ranging from low-tech technologies, such as

pencil and paper, to digital technologies, such as the Internet, digital video, interactive whiteboards, and software programmes. This type of knowledge, which changes with time (Koehler et al. 2014), enables teachers to apply different technologies to different tasks in their pedagogy, allowing learners to use different technologies to accomplish their tasks.

The above components define acquired knowledge and its educational role and function through communication and are overlapping. Their interaction creates a new cognitive three-part dimension conceptualised action where technology gains a prominent position.

a) **PCK** refers to the CK dealing with the teaching process. Developed by Schulman in 1986 (as cited in Muianga 2019:4), it shows the interplay between content and pedagogy that makes a subject content understandable to learners. PCK is different in various content areas, as it blends content and pedagogy to develop better teaching practices guided by relevant content areas. It comprises a comprehension of what makes the subject content complex or simple to comprehend and refers to the ability to adopt a pedagogy that connects with the demands of effective teaching. Moroney and Haigh (2020) (as cited in Muianga 2019:40) define the knowledge of how to transmit through teaching or instruction to learners the content of what is already known to the teacher. PCK can also be understood as the knowledge used to transform the subject matter in teaching. The transformation occurs when teachers interpret the subject and discover several ways to present the subject matter to familiarise and address learners' prior knowledge. PCK allows the teacher to accommodate or create situations that encourage learning, as it addresses the misconceptions existing within learners (Koehler & Mishra 2013).

b) **Technological CK (TCK)** defines the knowledge of how technology can improve subject matter content (Koehler & Mishra 2005, cited in Muianga 2019:40). Technological PK (TPK) also refers to a knowledge of the possibilities and challenges of technologies and how these can be applied to varied teaching approaches (Moroney & Haigh 2011; Koeler et al. 2014). TCK 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 how learners practice and understand concepts in a specific content area. Furthermore, it deals with the understanding of technologies used to teach the content that is known by the teacher but under the positive impact that technology can bring to teaching and learning. TCK

includes those technologies aiming at transforming education. Koehler and Mishra (2009:65) define TCK as "an understanding of the manner in which technology and content influence and constrain one another".

c) **TPK** explains how to apply technology in a different/multifaceted way for teaching. TPK refers to the comprehension of how various technologies can be used in teaching and realising that integrating technology could bring positive changes to the teacher's way of instruction. One must understand how pedagogy can transform classes in terms of functions and outcomes when specific technology tools are used wisely and skilfully through multiple and diverse methods. For the development of TPK, it is essential to have a profound understanding of technologies regarding restrictions and affordability.

Figure 3.1 shows the interwoven synthesis of the illustrated factors whereby teaching skills are being evaluated and critically challenged, while it is also the time when initiative, self-confidence and flexibility are needed the most to communicate with clarity and accuracy the required instructions in class. The interconnected aspects of knowledge offer the necessary lens to epistemologically observe and critically assess how instructions are being transmitted, received and applied. In this context, the visuality of the visual arts platform as a subject can transmit ideas far more directly through forms and shapes than linguistic symbols. Thus, technology does not only transmit ideas but also becomes significant to learning by rendering concepts more comprehensive to learners.

In line with Vygotsky's (1962) social constructivist theory, based on the idea that learners learn from one another and obtain new knowledge and skills through social interactions, connectivism describes how thinking and new directions in learning can be developed because of technology. Therefore, merging TPACK with connectivism as a theoretical framework provides the required lens for this study, as it gives direction and oversees the complexity of using ICT in education, with specific reference to the visual arts classroom.

Furthermore, one can use TPACK as a framework to show what learners can do and how learning can be stimulated when the teacher deliberately pulls all components of TPACK into a lesson. When all the components come together in the middle, this point becomes a knowledge-sharing pool, providing the type of flexible learning required in the 21st century, such as communication, collaboration, shared knowledge and problem solving.

In the proposed model, I believe, my study's chosen approach assists me in evaluating, as accurate as possible, the role of TPACK in bringing teachers and learners from various backgrounds together and allowing learners to interact and interconnect through their acquired scholar and technical knowledge. To enable learners to better comprehend the instructive content, Sujee (2019:94) emphasises the importance of teachers to integrate pedagogical technology in their teaching and learning approaches as an "additional teaching tool and not a purpose in itself".

This research, therefore, analysed the related problem caused by the process of connecting the familiar with unfamiliar innovative pedagogical approaches. This study has thoroughly analysed and empirically recognised how to integrate the mental with the physical knowledge in a comprehensible network that will enhance visual arts teaching approaches in Ghanaian senior high schools.

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

This chapter discusses my research design and methodology applied to address the aim and questions for this study, its stance, my approaches to data collection and analysis, and the limitations regarding my role and the ethical considerations involved. This study analyses several scholar viewpoints and literature based on statistical analysis regarding technology use in the visual arts classroom and its pedagogical significance to learners. For this research, the selection of the research subject, instrumentation and data collection procedures are applied to support a valid and reliable sample of actual art educators' practices.

4.2 Research paradigm

Based on a qualitative approach, the analysis of my study's subject matter is guided by an established interpretivist research paradigm in terms of objectivity and perceptions of reality. Therefore, supported by the philosophy of ontology and epistemology, my theoretical framework has been structured and organised in line with the needs of its practical execution to reach my research targets as close as possible to their objective reality.

According to Bredo (2000), reality is a creation of a society's culture, language and socio-political stratification; therefore, many realities exist, or various individual beliefs and perceptions of reality. Since my study's paradigm holds the idea that reality is a socially constructed multi-participant picture (Makue 2015), therefore, a trustworthy experience, I have looked at the world through the participants' eyes and, as an interpretive researcher, constructed reality from my viewpoint—a trustworthy presentation of the interactions recorded in the collected data (Blanche & Kelly 2002). Based on ontology, which refers to systems of beliefs and views about the nature of reality (Rehman & Alharthi 2016:51), and my empirical acquired knowledge, I have questioned the gathered information and, as meticulously as possible, assessed its reality from my viewpoint. As interpretivist, thus, my methodological approach is guided by a research paradigm based on two scholarly crucial ethical principles: trustworthiness and acknowledging subjective realities.

4.3 Research approach

The study has adopted the qualitative method as social research. Qualitative research is conducted with the assumption that reality is socially constructed; therefore, subjectivity is regarded real, acknowledged and accepted and, as such, assessed accordingly (Guba & Lincoln 1989). According to Johnson and Christensen (2012), the existence of a reality is certain and can be observed and measured because rational observers who look at the same phenomenon will agree on its existence and its characteristics. From a qualitative research framework, it is typically exploratory and inductive, where knowledge is generated and constructed by researchers through subjective but emphatic understanding, exploration and inspection (Johnson & Christensen 2012).

For this study of my phenomenon, through a critical, comparative discourse analysis within my research design, I believe to maintain an unbiased and as objective viewpoint as possible in my quest for answers to why and how (Hammersley 2008). To understand this study's phenomenon, I have explored the experiences of those who had been actively involved in the research and through a comparative approach and could analyse and critically assess the provided information. Analysing the data yielded multiple truths because both teachers and learners had different perceptions about using and manipulating technological devices and applications. Therefore, through the questions, "how things really are?" and "how things really work?", and the relevant answers, applying a comparative assessment, I concluded whether there was a single, objective truth of reality or multiple socially constructed subjective realities.

Contrary to the widespread belief, the application of a qualitative approach and data collection methods have long-standing relations in technology research and are receiving great attention from researchers in that area (Sadaf 2016:97). However, it is argued that since qualitative methods examine the why and how and not the what, where, when, and who of decision making (Denzin & Lincoln 2000), the research process is frequently linked to the researcher's subjective interpretations. However, Creswell (2013) and Nieuwenhuis (2016) note that qualitative data collection starts with the researcher's understanding and explaining of the problem in question by narrowing the focus on depth and detailed information, crucial factors to hold the credibility of the analysis.

Thus, in line with the qualitative guidelines, the analysis and assessment of the data collected from the observations and interviews about using educational technology includes describing how technology is applied in classroom activities and how teachers or learners experience its pedagogical role. As for the epistemological aspect of my research, in terms of the educational theoretical knowledge and its transmission to learners (Gall & Borg 2003:13), I have formulated and directed my questionnaire in the best way possible at how teachers have acquired and transmitted their knowledge in the visual arts class. As an interpretivist, I believe in a 'transactional' or 'subjectivist' epistemology; therefore, I cannot isolate myself from the schemata (the formulated realities) but comprehend them by staying connected with my subject matter.

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4.4 Research design

Despite their differences, a research design and methodology are frequently used interchangeably by researchers. Referring to strategies that outline its every aspect, a design aims at answering the research queries (Maree 2016; Nieuwenhuis 2016). It supports the research structure—the glue that rationally holds the research project together. As for methodology, the sample selection, treatment of research questions and data collection methods work together to address the central research question (Trochim 2006). Contributing to the discourse, Zikmund, Babin and Griffin (2012) explain a research design as "a comprehensive list of a plan in the implementation into an enquiry towards the recognition of its objectives". However, Zikmund et al.'s (2012) characterisation of making an enquiry model emphasises the approaches and steps in collecting and analysing information. Hence, a research design is an investigation outline chiefly to acquire data. It is also a drawing of a

meticulous preparation on how the investigation will be concluded. Thus, this research design involves my overall approach to the research phenomenon—the ontological and epistemological assumptions supporting the methodology in terms of rules, principles and conditions and directing the quest for answers and solutions (Gelo, Braakmann & Benetka 2008:270).

4.5 Case study

A case study is a particular form of ethnography when conducted in a naturalistic setting with in-depth use of narrative data from observations, interviews, transcripts and notes to create rich narrations of perceptions, attitudes, reactions, relations and environments. Nonetheless, case studies are differentiated from ethnographies because "case studies focus on one particular instance of educational experience and attempt to gain theoretical and professional insights from a full documentation of that instance" (Freebody 2003:81).

As a case study is primarily used for qualitative research to document and discuss the design and implementation of technological use, but these days are published as research articles in technology journals. Shulman (1996) corroborates that the absence of the impact of basic research findings on regular educational practices is the primary reason explaining this phenomenon, as the principles suggested by basic research are typically too vague and overly broad to be of any practical use for a specific context. However, the uniqueness of a case study can lead to an in-depth exploration of a contextualised instance based on broad in-depth data collection and reflection. The outcomes of case studies indicate an intense sense of time and place; they stand for a commitment to the broad significance of localised experiences (Freebody 2003:81). Yin (2009) indicates that a case study is a helpful research method for the following conditions:

- The focus of the study is to answer how and why questions.
- Researchers cannot manipulate the behaviour of participants.
- Contextual conditions are highly relevant to the phenomenon being studied.
- The boundaries must be clear between the phenomenon and the context.

However, some limitations are associated with a case study when approached by a qualitative research method. Some common critiques regarding these shortcomings include a lack of reliability and validity, the inability to generalise, uncontrolled bias and subjectivities. Some

issues to consider when using a case study include the following factors.

- A case study is susceptible to producing too much detailed data that overwhelm researchers and readers, causing them to lose focus of the primary issues in the research.
- A case study is not the most cost-effective way of doing research because gathering and analysing large amount of data can be expensive and time-consuming.
- The complexity examined in a case study is challenging to be represented simply, as there often are many ways to present the same set of issues with only subtle differences in approach and emphasis—the findings of the relevant case study become too complex to summarise (Hodkinson & Hodkinson 2001).
- An explanatory case study seeks to elucidate how and why an experience occurred to propose clues to a possible cause-and-effect relationship. Case studies are used to clarify or expand meaningfully on the presumed causal links in real-life interventions that are too challenging for the survey.
- An exploratory case study investigates the situations in which the intervention being assessed has no clear, single set of results. Fieldwork and data collection can be conducted before the establishment of research questions—research findings are typically observed as the onset of other forms of educational research.
- A descriptive case study, used in my study, aims at developing a complete document showing detailed experiences, presenting answers to several questions based on descriptive theories.

4.5.1 Why a descriptive case study?

As a component of the research design, my case study clearly defines the research purpose and forms a crucial unit of the analysis (Yin 2009). This research design component, realised through the data collection phase and the classification of the emerged themes, ties directly to my research questions and propositions (Merriam 1988). Thus, the primary reason for using a descriptive case study is that it offers a broad range and diverse methods of data collection and analytical techniques. I believe my approach allows a better insight into the research issue by testing the theory in practice and sharpening focus on the specific point of interest (Maree 2016:60), and simultaneously to function as a glimpse of the bigger picture (Terre Blanche, Durrheim and Painter 2006).

Furthermore, as a contemporary researcher on the issue of applying 21st-century technology skills in visual arts education, I have conducted a descriptive case study based on class observations, one-to-one interviews with teachers, and photographing learners' sketchbooks or visual diaries. I have also examined programmes, events, activities, processes, artworks and observed individuals in a well-defined framework in terms of time and space, as indicated by Creswell (1998) and Leedy and Ormrod (2001). Focusing on the pedagogical use of technology in the visual arts classroom/studio or ICT lab, the gathered information on ideology and practical reality has been critically assessed, leading to conclusions constructed on sequential patterns.

4.6 Research site

Choosing a suitable and practical research site besides being crucial (McMilan & Schumacher 2001) is the first step (Creswell 2013) in collecting data for the research in question. For ethical reasons, the names of the four selected schools from the Akwapim South District in the Eastern Region of Ghana are not disclosed but defined as:

- Senior High School A – Category A
- Senior High School B – Category B
- Senior High Technical School C – Category C
- Senior High School D – Category C

The abovementioned categories of the schools are based on the population size, the social and economic infrastructure, teaching and learning materials, the time of long-term academic performance of each school, with two visual arts teachers and four learners' artworks representing their correspondent schools. Furthermore, the research site was chosen because I am familiar with the area and have stayed in the Municipal area for more than ten years.

4.7 Population and sample

A study population is the group of interest to the researcher, and a sample is a group or subset of the population with characteristics representative of the total population (Cohen, Manion & Morrison 2007;). The reality of resource constraints might not allow one to address the entire population and should rely on sampling. It is a procedure of selecting a quantity of persons or substances from individuals such that the chosen group contains the necessary characteristics established within the group (Orodho & Kombo 2002).

In my study, I have selected participants through purposeful sampling, where individuals and sites were selected because they provided insightful knowledge on the central phenomenon of the study in question (Creswell 1998; 2013), in my case applied approaches for the integration of technology in the visual arts classroom. The samples are specifically chosen as a representation of the criteria set (Ritchie & Lewis 2003). In this case, the study population comprises four south district senior high schools in the eastern region of Ghana, with the total sample of 24 visual arts participants, eight teachers and 16 Form 2 learners' artworks.

Due to large numbers of visual arts learners from the selected schools, the lottery method (a random sampling technique of selection) has been used where learners' artworks were selected and photographed for the purposive sampling for this study. This aligns with Babbie and Rubin (2010) explaining that a sample is based on the researcher's judgement about which schools and learners are most representative or useful for completing the relevant research.

For this study's demands, the above mentioned four (4) schools were purposively selected, all situated in the same district but under different categories, as prescribed by the Ghana Education Service Placement of Schools System. Learners in Form 2 were specifically chosen because they have been in the system for at least one year and have two years left to complete their schooling. Furthermore, Form 2 learners' academic calendar matches my research needs.

4.8 Data collection methods

The methods for data collection regarding the population, sampling, data collection plan research instruments, interviews, observation, source analysis, objectivity, data analysis method for validity, reliability and trustworthiness, ethical issues, and limitations of the study are discussed here.

4.8.1 Data collection

For this research, primary and secondary data were used as follows. The primary information data were gathered using semi-structured and in-depth interviews (only with teachers), class observation notes and document analysis (Creswell 2013). The secondary information includes journals and articles relating to technology-based approaches applied in arts education. For this study, I collected qualitative data, ensuring trustworthiness of my findings and minimising bias that might otherwise arise from a single data collection method by

allowing multiple data collection tactics (Kennedy 2009). To further minimise bias views, triangulation was used as a strategy to ensure the phenomenon in question is studied from different angles (Sands, Bourjolly & Roer-Stier 2007).

4.8.2 Instrumentation

The data collection method used in the study is designed specifically to describe art educators' current use of technology in their classrooms in addition to their attitudes pertaining to using technology in their art instructions. Semi-interviews and observations were the research instruments used to collect vital data from the respondents.

- Semi-structured interviews

An interview is a major source of information because it helps the researcher acquire in-depth knowledge on the subject matter. Interviews are primarily done in qualitative research and occur when researchers ask one or more participants general, open-ended questions and record their answers. Often audiotapes are used to allow for more consistent transcriptions (Creswell 2012). In my study, I used open-ended questions and recorded them with the permission of the research participants. Further, these interviews provide in-depth data through follow-up questions. Probing questions were asked for clarity wherever necessary. However, there were some challenges in following the same procedure through interviews. An informal written guide was needed to maintain uniformity regarding questions. The process was slow, and expensive; therefore, it called for using a smaller sample size.

- Observations

Observation protocols are methods used in research to observe and document events, behaviours, or conditions. These protocols typically involve procedures for recording observations, data collection tools, and criteria for evaluating the quality of observations, and are designed to ensure reliability, validity, and objectivity of collected data (Bogdan & Biklen, 1998). Observation protocols can take on different forms, such as systematic, structured, and participatory observation.

Observation processes comprise participant and non-participant observations. Participant observation is a primary method in ethnography and ideal for this study (Hammersley 2006; Fetterman 2010; Madden 2013). In the participant observation, the researcher participates in

the practice of cultural and social activities being studied by living the experience and being among the people under observation.

The observation phase of a study can sometimes be complex regarding seeing what you see, as the researcher does not always understand the actions and doings of people (Mortberg et al. 2010:110). Observation can also be challenging in terms of what to observe and where to start. Sometimes, to overcome these challenges associated with observational studies, it is appropriate to observe a single person for some time to obtain that specific perspective on a practice. Afterwards, observing more people will provide a much richer picture of the setting of the work practice (Sadaf 2009:97).

Nonetheless, for the sake of fair balance between observation and participation, Tacchi, Slater and Hearn (2003) argue that the researcher must assume an observational position to describe and achieve an impartial interpretation of the data. As Fetterman notes, participant observation involves one's engagement in the reality of the people participating while maintaining one's professional distance (Fetterman 2010).

There are three approaches for observation according to Pole and Morrison (2003):

- Total participation where the researcher's role is kept secret
- Participation in normal settings where the researchers' role is known to certain gatekeepers but concealed from most people (Pole & Morrison 2003:22)
- The above two approaches permit for observation without affecting the natural setting and simultaneously maintain distance from the research.

By the third approach, regarding participation as observer, the researcher's role and identity are completely open with the given advantage of shadowing and directly observing the study subjects' normal life and the details of interest in-depth (Pole & Morrison 2003:33). Bryni, Gherardi and Poggio (2005) describe shadowing as following a varied level of actions and interaction by collecting data on on-the-ground phenomena (Bruni, Gherardi & Poggio 2005:198). Shadowing is conducted within a predetermined time by taking note of how people individually and collectively engage in their daily activities. Shadowing helps the researcher to act invisibly and focus on taking notes of the actions of the people observed and asking questions when alone with the person of interest (Bruni, Gherardi & Poggio 2005:198).

- AEIOU
- observation framework

This study adopts the non-participant observation approach in collecting data from the respondents. According to Adeoye (n.d.), AEIOU is a framework that can assist designers in considering a scenario or problem from multiple perspectives. The framework can help in organising thoughts, observations, and ideas into distinct categories, and is particularly useful for conducting contextual inquiries and collecting qualitative data. By structuring observations according to the categories of Activities, Environments, Interactions, Objects, and Users, researchers can gain a more comprehensive understanding of a user's experience and identify areas for potential improvement. One data collection method is observing activities concerning technology in visual arts classrooms. I have studied the approaches in using technology and documents in detail on how teachers and learners have been engaging with technology in visual arts teaching. Participants' anonymity has been strictly adhered to by replacing their names (which I, as the researcher, withhold) with pseudonyms.

The primary advantage of the observation method is its usefulness when a study involves behaviours of individuals that cannot respond truthfully to other methods, such as in-depth interviewing (Bryman 2004:338). Observation, as a primary research method, can strengthen the data collected from in-depth interviews, digital photographs of the sketchbooks or visual diaries, which can be individually and collectively validated (Tellis 1997). This is suitable where a grounded theory approach is used for analysing a study under a descriptive case study, which is directed in a naturalistic setting. The observer studies the participants in their true nature; in my study I observed the learners in their visual arts classrooms and art studios.

Activities are performed through role playing in simulation to identify one's thinking, talents and creativity. A disadvantage of the initial observation is that the first impressions created by the participants affect subsequent observations, referred to as the halo effect. Furthermore, the participants react typically because they are being observed, referred to as the observer effect (Merriam 2002; Yin 2009). In line with the above analysis, a qualitative research approach within an interpretivist paradigm was suitable for this study, as it acknowledges the observations of individual behaviour (Mertens 2014).

4.8.3 Source analysis

Typically, a case study uses evidence from various sources, such as relevant literature,

interviews, observations and documents, photographs and artefacts beyond the range of sources of evidence available in a historical study (Merriam 2002). For my study, I will analyse primary source material relevant to my research questions and secondary material through photographs of sourcebooks and artworks. I will use a journal to assist me when comparing notes or evaluating conflicting ideas (Jasper 2005).

As a visual arts teacher using technology in my classroom, I have assumptions about what is hindering teachers from integrating the traditional with the technological. To prevent bias, I have used a reflective journal that assisted in being precise and transparent and provided an audit trail of the research journey (Jasper 2005).

Furthermore, one should consider the possibility of my being biased during data collection and observation because the study is qualitative, entailing data collection through my observation and open-ended interviews. Furthermore, having practical experience as a teacher in visual arts and technology might personally influence the outcomes of the research regarding the opinions expressed by the interviewees.

Consequently, the observations and digital photographs have guided my quest for answers to my initial questions. Moreover, to draw meaning from the photographed products, the images are used as illustrations supporting the answers to the research questions. Note that while the observation is treated as the primary information source, the digital photos are secondary sources because I had to reproduce the original drawings photographically.

4.8.4 Data analysis

Open coding refers to the analysis by which data is categorised to facilitate the analytical process. According to Taylor (2001), the first step in the research process is to understand the data collected from the respondents. The researcher should aim to interpret the narratives of the respondents by asking questions such as "What does the respondent really want to say?", "How is it said?" and "What does it mean?" (Taylor 2001). As such, using the open-coding method helped improve trustworthiness during my data analysis process, as classified information about how conclusions were drawn was given to the reader.

In this study, I analysed the data obtained from photographing learners' sourcebooks and

artworks. The photographs were used as illustrations to inform and support the answers to my research questions. The benefits, challenges and problems for the proper use of technology in visual arts classes were identified and analysed. Then, the recorded data were transcribed, summarised and organised it into categories and sub-categories. I also used quotations to capture the experiences of teachers about using technology in visual arts in their own terms and understanding.

In my research project, I used both inductive and deductive coding to analyse the data collected through in-depth interviews with eight teachers. The difference between inductively emerged themes and deductively formed codes lies in how the themes or codes are developed during data analysis. (Soiferman, K.L. 2010). Inductive coding involves the researcher starting with the raw data and discovering patterns and themes that emerge from it. This process is data-driven, meaning that the researcher allows the data to guide their analysis and the themes that emerge from it. Deductive coding on the other hand, starts with a priori codes or pre-existing categories that the researcher has developed based on their research question and theoretical framework. In this approach, the researcher applies these pre-determined codes to the data and categorizes it accordingly (Soiferman, K.L. 2010).

In summary, inductive coding is a bottom-up approach where themes are discovered from the data, while deductive coding is a top-down approach where pre-existing codes are applied to the data. The choice between the two depends on the research question and the study's goals.

To begin, I transcribed the interviews and conducted an initial coding of segments that seemed relevant to my research question, which was developed through a deductive approach. I identified and coded segments that related to the teachers' motivation for using ICT, their experiences, and their thoughts on integrating ICT in the VA classroom. This initial coding process used an inductive approach to allow for themes and patterns to emerge from the data.

After this initial inductive coding, I developed a codebook based on my research question and theoretical framework, which took a deductive approach. The codebook contained a priori codes related to teachers' motivation for using ICT in the VA classroom, personal experiences, and thoughts on integrating traditional methods with digital. Using the pre-determined codes, I applied deductive coding to the transcriptions, categorizing segments of text that related to each code.

As I continued to code the data, patterns and themes continued to emerge in an inductive manner. For example, I noticed that many teachers mentioned feeling overwhelmed by the ICT integration or that they valued the support they received from their peers. I then refined the codes, checking for consistency and revising them as necessary, and added new codes when appropriate. The final set of codes included both a priori codes developed through a deductive approach and codes that emerged from the data through an inductive approach.

Overall, using a combination of inductive and deductive coding allowed me to analyse the data in a structured and organized way while also allowing for flexibility to adapt to new themes and patterns that emerged from the data. The deductive approach helped to ensure that I was analysing the data in a way that aligned with my research question and theoretical framework, while the inductive approach allowed me to identify new themes that may have been missed with a purely deductive approach.

4.8.5 Trustworthiness/validity/reliability

Trustworthiness is the core quality criterion of the research design. For Ary, Jacobs and Razvich (2002), credibility and trustworthiness define the accuracy of data. According to Veal (2011), Bryman (2012), and Loh (2013), trustworthiness comprises four components, which certify the visual arts validity of the findings. Credibility is the component that measures the visual arts value of the findings in terms of rationality and applicability. Transferability requests their applicability in other contexts, dependability weighs their diachronic reliability, and confirmability is the component evaluating their degree of objectivity during the research. These components strengthen trustworthiness to reach its aim and function as follows:

- *Credibility* involves member checks, which legitimately will establish the truthfulness of the results by assessing the information and controlling subjective judgements. To prevent researcher bias in my study, an audit trail was conducted where experts in the Department of Humanities Education supervised each phase of the study and provided constructive input.
- *Transferability* estimates the study's compatibility with other contexts or experiences. During this phase, I provided an understanding of the subject, the research design, a thorough explanation on how rational ideas were generated and the appropriateness of data gathering techniques.

- *Dependability* in qualitative research ensures the findings' consistency. Data sources might alter during the gathering process to further enhance the analysis. I kept a record journal of the data analysis process and case study observations for additional information.
- *Confirmability* defines the removal of any interference by the researcher so that the findings are purely focused on the participants' responses and views about the researched context (Maree 2016). During this process, I ensured that the findings of my research study was trustworthy and accurate as the data collected was unbiased. I reported my findings purely on the participants' responses as objective and transparent as possible. By adhering to the principles of confirmability, I can increase the confidence of other researchers, stakeholders, and the wider public in the validity and reliability of the research findings.

Validity is the degree to which the results obtained from the data analysis represent the phenomenon under study. Orodho (2005) defines validity as a prior qualitative procedure test of the research instrument to ascertain how they are accurate, correct, true and meaningful in enhancing the intended data for the study.

Reliability a measure of the degree to which a research instrument yields consistent data after repeated trials (Mugenda & Mugenda 2003). Therefore, an instrument is dependable when it can measure a variable accurately and constantly and obtain the same results under the same conditions of a certain period.

Furthermore, multiple triangulation efforts are undertaken using more than a single data type, more than one research assistant, an appropriate research method and member checking. Longer and richer quotes are used in the results discussion with contextualised snippets because their combined application sustains a trustworthy qualitative methodology. My research sample is based on teachers that have been observed and interviewed and on learners who have been observed but not interviewed (Lincoln & Guba 1985:301-327). Therefore, I employ the following strategies: briefing sessions, member checks, audit trail and personal notes (Maree 2016).

4.9 Ethical considerations

For data collection at schools and the continuation of the research by the ethical code of research practices (Yin 2016), an introduction letter from the University of Pretoria, Faculty

of Humanities Education, a permission letter from the District Director of Education (DDE) and the Ethics Committee of the University of Ghana were provided to the participants. The informed consent documents have been reviewed and approved by the university of Pretoria's Ethical Committee. I addressed a letter requesting permission to conduct the research to the principals of the four identified senior high schools in Ghana, including evidence of permission granted by the DDE to conduct the research at their schools. The letter presented the purpose and aim of this study, the research methods and procedures to be followed and details of the data process for data collection. After the principals' approval, all signed consent forms that guarantee teachers' and learners' voluntary partaking, anonymity and confidentiality would be maintained. During the observations, no record of names of the learners nor their school were kept, and code names were used for the teachers. As for the audio recordings, the semi-structured interviews and the right to object, the participants were accordingly informed of their anonymity and were free to withdraw from the study at any stage without adverse effects. This ensured that the teachers felt at ease while being observed and acted as naturally as possible in their daily teaching environment. Throughout the study, all ethics protocols were followed.

4.10 Contributions and limitations of the study

This study will benefit principals, visual arts teachers and learners to enhance knowledge and skills through technology. It will contribute to government efforts to efficiently equip schools with technologies or promote in-service training on using digital technologies while academically serve as reference document. The study will benefit national policymakers and stakeholders, school leaders and other authorities in developing steering documents. Learners will develop independency and competency with adequate information on technology applications in a global market. Personally, I will be well armed with much expertise to guide my learners and contribute nationally and internationally on studies relating to technology integration in teaching and learning. The recommendations set will be beneficial to the design curriculum in visual art, focusing on integrated technology.

Transmission hitches, data expense and job tasks are significant challenges in pursuit of this academic project of such magnitude. Scarcity of information, limited number of teachers and school representatives, and publications, especially in third-world economies as ours, serve as constraints to information gathering. The scope of the work is time-consuming and costly in terms of data collection and searching for materials, whereas distance has prevented

frequent field work. The process is inspiring but expensive because, at times, some monetary request is made in exchange for vital information.

4.11 Chapter summary

This chapter discussed the research design and methodology applied to address the aim and questions for this study, its stance, my approaches of data collection and analysis, and the limitations regarding the researcher's role and the ethical considerations. The study analysed the literature based on statistical analysis regarding technology use in the visual arts classroom and its pedagogical significance to learners. This qualitative research, I was informed by an interpretivist paradigm because I wanted a deeper understanding of how technology is used in the art class by teachers and by learners. My sample selection comprised four senior high schools in the Akuapem South Municipality. The analysis was based on one-on-one interviews with eight visual arts teachers and class observation of learners. Photographs were taken of selected sketchbooks and or visual diaries. The selection of the research subject, instrumentation and data collection procedures were applied to support a valid and reliable sample of recent art educator practices. Furthermore, art education was discussed, the pedagogical importance of technology is applied by art teachers in their classroom, the areas of concern in its application, relevant problems and solutions were also examined. The following chapter presents the analysis of the data collection.

CHAPTER 5

PRESENTATION AND ANALYSIS OF DATA

5.1 Introduction

The enormous impact of ICT on various fields (i.e., medical, commerce, engineering, tourism, business and trade, law and architecture) of the human enterprise has been manifested primarily in the last thirty years. Though, concerning the educational sector, there seems to have been an absence of ICT influence when compared to other disciplines; therefore, ICT's impact on the education field has not been as prominent as in other fields (Collins 2002; Bolujide 2016).

Quality instruction has usually been linked to supporting and dedicated educators having good relationship with their learners. As education has a social nature, high-quality teaching takes place through positive interaction and effective communication. Garrison and Anderson (2003) opine that by applying ICT in the instruction process can improve the quality of education in numerous ways. Inclusion of ICT in the curriculum can motivate learners, increase their activity engagement, streamline their gaining of basic computer skills, and enhance teacher training.

In this chapter I will offer an analytical presentation of the interviews which were conducted on the teachers' pedagogical approaches and application of ICT in the instruction process of visual arts in senior high schools in Ghana. The interviews were conducted with a sample population, as discussed in the introduction of my study and conducted at four (4) selected senior high schools in the Akuapem South Municipality.

Consequently, the analysis will focus on a) personal interviews (with eight teachers), b) class observation of 16 learners, c) the examination of photographs of learners' sketchbooks or visual diaries, and d) post-observation interviews with teachers, all in the framework of using technology in the instruction of visual arts classroom. Considering the first step to facilitate the analytical process was using open coding to categorise the data, allowing for the opening up of questions, sketchbooks and visual diaries to answer the research questions:

"What are the current technological tools being used in VA teaching and learning, and how are they being used in conjunction with traditional methods?"

"How can integrating of technology and traditional tools improve visual arts teaching and learning at the Ghanaian SHS?"

As such, I will investigate the teachers' responses and compare them to the evidence in the learners' sourcebooks by asking "what did the teachers really want to say?" and "how did the learners understand it?" (Taylor 2001).

The section below presents some of the interviewed teachers' voices, followed by an analytical discussion based on the study's objectives. The data show the number of years teachers have been teaching in the various schools used for the study i.e., Schools A, B, C, and D.

Table 5.1: Teachers' ages and their teaching years' experiences

School	Teacher	Teachers' ages	Years teaching experience	Years teaching visual arts
A	1 (T1a)	48	25	20
A	2 (T2a)	36	10	10
B	1 (T1b)	32	10	10
B	2 (T2b)	51	14	14
C	1 (T1c)	40	12	12
C	2 (T2c)	35	10	10
D	1 (T1d)	34	4	4
D	2 (T2d)	57	14	14

5.2 Teaching/learning of visual arts: scope and application of pedagogical approaches

Under the themes *general background of learners in the school; the definition of technology; the frequency of use of technology for instruction in the visual arts studio or classroom; most frequently used ICT tools for teaching visual arts theory and practical; teacher's confidence level in using technology in teaching visual arts*, views of eight teachers from the sampled senior high schools (schools A, B, C, and D) were ascertained. Moreover, stemming from each sampled school, one teacher was female and seven were male visual arts teachers. The interviewee's ages ranged from 32 to 57 years old. To ensure the participants' anonymity, the selected teachers' and schools' identities remained anonymous. As such, participant codes

were used: teacher 1 from school A is referred to T1a, teacher 2 from school A as T1b, teacher 1 from school B as Tb, and so on.

When asked what he defined as technology, T1a from senior high school A hinted that technology refers to using modern tools or resources, processes and practices in teaching and learning. The teacher made it known that he uses technology daily to teach and learn content in the visual arts classroom. On using technological tools, T1a indicated that he uses digital cameras, mobile phones, a computer, designing software, smart tv and projector more frequently to enable him to teach theory and practical art. On his confidence level using technology in teaching visual arts, the interviewee who has been teaching visual arts for more than 20 years stated that he has a 95% confidence level in using technology. Stressing the general background on the scope and use of IT in the visual arts' teaching and learning context in School A, T1a had the following to say:

"My school places premium on the visual arts programme because of the immense contribution we offer in areas of campus beautification, creation of visual communication products, labelling of items, stage/hall decoration, etc. visual arts electives include graphic design, picture making, sculpture, leatherwork and elective ICT in addition to GKA. Students are inspired by teachers and respond positively."

T2a, a 36-year-old female with 10 years' teaching experience in visual arts from senior high school A gave her impressions on the general background of learners in her school. She stated that most learners studying visual arts come from the southern and eastern parts of Ghana, with little or no prior knowledge in the visual arts courses offered at the school. Starting with technology, T2a believes that any tool is welcome to make work or production easier. The teacher stated that she uses a laptop and a projector most often for teaching art history and theory and art practical. She is "*very confident in teaching visual arts and especially, when I use technology*".

On the definition of technology, T1b from senior high school B indicated that "*technology means applying scientific knowledge in a practical way to make work easier*". On the frequency of its use, T1b stated that he uses technology frequently during his lessons in the visual arts classroom. "*A laptop, a projector and a smart phone*", he said, are the ICT tools "*I use most in teaching visual arts theory*". For practical art, he emphasised that he uses a smart phone. On his confidence level in teaching the subject, he "*has total control of his subject*

area". His general teaching experience and subject specialisation is 10 years, making him feel "*very confident in using technology to teach visual arts, as most of the students in the visual arts class are passionate with the study of art*". This, to him, makes teaching and learning more interesting and interactive.

Moving on to another visual arts teacher (T2b), a 51-year-old male from the same school, with 14 years' teaching experience (all in the subject visual arts), describing the general background of learners in his school, began by giving a pathetic background of learners in his school:

"We do not have well-endowed students for the department. Always our place is the last stop of weak students, boys and girls, in academics and sports".

After remaining mute on the definition of technology, T2b indicated that confidence comes about when you know your subject. He stated that confidence is seen as the result of mastering content and, as such, it confirms his having reached a high confidence level. He further interpreted using technology in the visual arts teaching and learning classroom as "*some sort of skill*", and the teacher applying them as being innovative.

T1c from senior high school C is a 40-year-old male who has been teaching visual arts for 12 years. T1c defines technology as a "*scientific product that makes life easier*". T1c uses his smart phone, laptop, and the school's projector most days for teaching art history and theory and the practical art skills, maintaining an excellent confidence level.

Similarly, another art teacher (T2c), with 10 years' experience in teaching visual arts and from the same senior high school as above, considers technology and ICT tools as essential in his daily activities. For instance, when asked about using mobile phones and other technology, he said that their school's visual arts department has their own projector, which he often uses to show videos on relevant topics being taught. T2c stated that he has been using his personal mobile phone to connect to the school's Wi-Fi to research subject matter and retrieve content from the internet to teach his lessons. Sometimes, he also connects to the projector to display the applicable topic to learners to follow easier through visuals. Based on his learners' performance, T2c believes that he is doing well compared to his colleagues who use ICT tools less often. He believes his approach to be serving as a motivation to boost his confidence level. He proudly emphasised that for the past two years, his learners achieved a 100% pass rate in their West Africa Senior School Certificate Examinations. Therefore, he has developed

a remarkably high confidence level in teaching the subject. T2c stressed that he has always been using his personal phone and the projector when teaching his subject and was conversant with their use.

Another interviewee from senior high school D (T1d), got this to say on the general background of the learners in his school:

"*Some of the students are good academically but others are not. The visual arts subject was forced on some students because there was no space in the school for them in the subject of their choice. The performance of such students is seen in their classroom work. This is because they do not have interest in the subject*."

T1d considers technology as tools to enhance the traditional skills we have. This interviewee, like others, uses a projector and mobile phone to show slides to learners. T1d emphasised that he normally downloads pictures on what he plans to teach from the internet, and using a pen drive and a laptop he presents his subject matter to the learners. The teacher felt that it was his duty to teach others the same, as someone had taught him what he has acquired.

T2d thinks of technology as a scientific gadget to enable users to work faster, for example, using protectors, mobile phones, and laptops. However, T2d highlighted that he uses technology once a while in his teaching content or for demonstration purposes. He uses it to explain new concepts to learners, for example, he sometimes downloads relevant teaching materials from the internet to be employed in his instruction.

Accentuating the ICT tool(s) he uses mostly for teaching visual arts theory and practical, T2d hinted:

"*I normally use laptop and mobile phone in my teaching. Paint brush, photoshop, power point are some of the applications I mostly use. In my practical lessons I use [a] laptop and projector to show the students what I want them to do and afterward, they practice it*."

In teaching visual arts, T2d, like others, draws his confidence from the thorough knowledge of his subject matter, and since he believes he holds the mastery over his subject, as a teacher, he feels sufficiently confident. T2d is 57 years old and has 14 years of schooling practise, all in visual arts; hence, it is understandable that he has full confidence in his teaching experience.

The above responses illustrate that teachers draw their confidence from the proficiency in the instruction content of the subject matter, and especially from the positive results of their learners. This confirms Khairezan's (2015) view that for successful educational outcomes, a teacher's teaching strategies play a decisive role in terms of accuracy in contextualisation and suitable control of the relevant learning process. Therefore, a teacher can play a significant pedagogical role by selecting the most effective or available medium and strategy/s of teaching, consequently determining the quality of the learners' acquired knowledge through practices integrated with ICT.

Regarding the subject matter compared to other approaches, most of the interviewed art teachers incorporated ICT as a teaching instrument. The basic use of ICT among visual arts teachers has caused concerns among several researchers. Coleman and Cramer (2015) and Mohd Khairezan and Au (2017) indicate in their studies that art educators still lack the experience and skills, hindering them to assimilate ICT creatively in their visual art classrooms.

Inference from my study depicts that the interviewees understand technology as using tools to enhance or improve the skills that one already has. Similarly, as mentioned in Chapter 2, studies stress that educational technology can be defined as any piece of equipment or device, be it electronic or mechanical tool, that can assist learners to accomplish the required knowledge and targets (Davies, Sprague & New 2008). It covers the instructional technologies proposed for teachers to communicate proper instructions and the learning tools for learners to achieve their specific performance objectives. Cited as a motivating factor to adopt ICT, subsequently, can engage and inspire learners (Grenfell n.d; Long 2001; Wood 2004).

This study's findings again reveal that most visual arts teachers are too confident about their ability to use ICT. However, available studies disclose that most visual arts teachers' confidence levels about using ICT is considered to be 'fair' (Mozejko 2015; Gil-Flores, Santero, & Gordillo 2017; Tondeur et al. 2017; Makki, O'Neal, Cotton, & Rikard 2018; Teo & Huang 2018). Although most educators are well-informed about of the advantages of using ICT in education, their aptitude, skill and willingness were described as 'low'. Previous studies have recounted similar situations (Tondeur et al. 2017; Makki et al. 2018).

However, many of the interviewed teachers expressed their frustration and said that there were some limitations blocking their self-confidence toward effective ICT integration into their instruction process. For example, most visual arts teachers express that the shortage of computers and ICT peripherals were the primary factors jeopardising their interest toward ICT integration. This statement is comparable to former research results (Gil-Flores et al. 2017; Teo & Huang 2018), indicating that teachers had already voiced their need for more training in ICT related courses.

5.3 Pedagogical IT knowledge of visual art teachers

On pedagogical approaches, T1a, when interviewed, indicated that well-resourced studios and workshops will prepare learners in a conducive learning environment that can influence, at large, the quality of instruction of visual arts in schools. T1a interviewee noticed that the visual arts process (drawing and creative planning) is resourceful and fundamentally useful. Hence, to broaden its creative spectrum, using technology in teaching and learning becomes essential. T1a stated that he allows learners to use technology in their drawings or planning of their final artworks. Again, the teacher added that he permits learners to access the Internet for information concerning the visual arts subject. To accentuate this point, the interviewee stated that,

"*I allow learners to access internet for information concerning the visual arts subject because the internet has a wide range of information for learners to explore*".

Further, T1a asserted that teachers mostly approach their own ICT learning based on the capabilities of each teacher. T1a indicated that ICT literate teachers relate well and wish to further develop their skills and, if possible, assist illiterates to break away from their intimidating factors through proper information and training. He also stated that inborn creativity and qualified proficiency in instruction inspires and maintains a teacher's motivation. T1a emphasised the availability of appropriate tools and materials are essential factors that significantly affect teachers and learner's motivation and performance in visual arts in senior high schools.

T2a interprets visual arts drawing and planning as a process where learners develop their ideas and materialise their imaginations. Consequently, T2a most often allows learners to use ICT in their drawings/planning of their artworks. This interviewee also established that using designing tools and materials are factors that considerably affect learners' motivation and

performance in visual arts in senior high schools. Therefore, using creative ICT tools and materials are essential and necessary in the teaching and learning of visual arts. Due to this, it is incumbent that the government and other stakeholders render these tools and materials available for visual arts learners to enhance their practical skills. A 21st-century visual arts teacher and student should be able to use such tools with ease.

Regarding the use of technology in the visual arts classroom, another interviewee, T1b, asserted that learners are equipped with skills to fit and meet the target of the computer generation, as it makes work easier, unlike the traditional way of working. He continued by saying that learners are taught to generate ideas from everyday objects and are encouraged to use pareidolia to visualise and generate artistic concepts. Due to the vital role of serendipity in the drawing and planning process, to increase its advantageous possibilities, T1b confirmed that he allows learners to use ICT in the drawing and planning of their final artworks due to the advantages they enjoy from using ICT in the visual arts drawing process. T1b again made it clear that he uses ICT tools, such as a computer, frequently for teaching purposes. Regarding internet accessibility, T1b mentioned that he allows learners to access the Internet for information concerning the relevant subject. T2b, in responding to the question about factors influencing the quality of instruction of the visual arts subject in his school, indicated the following concerns: *"the timetable, the number of periods, the act of teaching*".

Interviewee T2b, upon sharing his opinion on the visual arts process (i.e., the drawing and planning process), explained that the process is good for the learner, as it helps them understand the subject matter better. However, he expressed his concern that not many shared his opinion: "*the country [Ghana Education Service] did not see its importance*". Worthwhile noticing, this respondent does not teach learners to use ICT in their final artwork drawings/planning because the West African Examinations Council does not acknowledge such uses in learners' final practical works, according to him.

Interviewee T2b further emphasised that learners are always excited when they see information technology-related tools in the classroom. Consequently, the teacher revealed that he uses ICT/computer daily to enhance teaching and learning purposes. According to T2b, it is not challenging to integrate ICT into visual arts teaching due to the existing familiarity of the youth with sophisticated phones. Therefore, concerning his subject, he allows learners to access information on the Internet, as he expects them to know that all relevant information they need can be found on the Internet.

Concerning the feedback on the quality of teaching and learning visual arts, according to the next interviewee, teacher 1 from senior high school C (T1c), the visual arts value of the instruction is positively affected when, along with the constant practice of ideas and knowledge, the teaching and learning process is supported by materials and tools. On the importance of the drawing and planning process, the interviewee had the following to say:

"*Drawing forms the basis of [the] visual arts course. I encourage students to draw anything that comes to mind. By drawing constantly, we are able to build the various processes together*".

It is evident, however, that the interviewee does not allow learners to use ICT in their drawings or planning of their final artworks frequently, as the devices are "*woefully inadequate for individual work*".

Another respondent, teacher 2 from senior high school C (T2c), on how he interprets the use of technology in teaching visual arts, stated the following:

"*The use of technology in teaching visual arts would have been the best. It is the talk of the day in the world. So, if our students experience it while in school, they will also use it when they are out there in the world*".

In response to the question about factors influencing the quality of teaching and learning visual arts, T2c expressed some positive viewpoints on collaboration:

"*In my school, we have competent teachers teaching the subject. There are about 13 teachers in the visual arts department. We are all united so where I fall short other teachers come in and assist, and this makes the work easy*".

As he explained his teaching approach, T2c normally asks his learners to go through the development process of an idea as follows. He guides them to pick an object from their environment and on the internet and creatively build upon it. According to T2c, this helps them to produce a unique work structure. He said that through this process, he allows learners to use ICT in their drawings and planning of their final artworks. Furthermore, to access information in the class, as he explained, learners often come to him, asking to use his mobile phone for various search engines, such as Google. According to T2c, this approach helps him to strengthen the communication between him and the learners. This teacher uses ICT for

quality instruction purposes, but he also refers to his need for more ICT devices, such as laptops, to enhance the teaching and learning processes. The teacher, by his initiative, allocates research work to the learners, as he believes that by challenging them to depend on their capabilities, he trains his learners for the world. T2c states that there are many challenges in terms of innovative designs out there of which learners, as future citizens, ought to know and be prepared to deal with as well as possible. Accentuating how T2c approaches his ICT learning, he stated:

"*I also from time to time upgrade myself in order to catch up with the moving trends in the world. I now know how to use Photoshop, Corel Draw applications*".

Moving on to school D, the visual arts teacher, T1d, aged 34, compared to the rest interviewed, has the least experience of four years in teaching the subject. From his viewpoint, T1d provided a specific detail on the reasons he uses technology for teaching visual arts:

"*I use Technology when I am teaching the practical aspect of the visual art subject. Again because of the large class size the use of projector is assisting me in the teaching of the visual art subject*".

For practical reasons, T1d uses technology to achieve the following goals: a) to show the practical aspects of the relevant skill and b) the class is too large to teach one-on-one skills. In this case, an instructor uses technology for their practical purposes: first, as an agent to facilitate the instruction process and second, to maintain control over a larger group of attendants. Accentuating the confidence level in using technology in teaching visual arts, T1d hinted that,

"*The use of technology assists me in teaching the visual arts subject because with it, I talk less and also students experience what I teach. I always use my mobile phone so in teaching with it, it becomes simple*".

T1d interpreted using technology in the visual arts teaching and learning classroom as follows:

"*We live in an era where technology is ubiquitous, and learners are accustomed to using it, so I believe I must incorporate technology into my teaching. I believe that teaching the visual arts subject requires time and patience as learners begin to understand the concept of the art piece over time*".

The above statement reflects the teacher's awareness of the fast development of technology and by staying ahead, he incorporates technology into his teaching. This too mirrors the teacher's mindfulness that by incorporating traditional skills with technology in his subject, visual arts become more understandable to the learners since these skills are part of their everyday life.

T1d used very specifically the term ubiquitous, which in the computing industry refers to the concept that ICT is omnipresent—everywhere. Furthermore, ubiquitous computing is a specific concept, coined by Mark Weiser in 1991 (Mathew 2013). Ubiquitous computing "is a human–computer interaction model that integrates the information processing into everyday objects and activities. It is a paradigm shift that makes the technology virtually invisible in our lives" (Mathew 2013:595).

On the use of ICT tools, T1d uses technology mainly for teaching purposes when necessary, as some topics in the syllabus do not demand ICT use. Yet, he does so out of his choice and because his school currently offers Wi-Fi connectivity. Equally to previous interviewees, T1d uses a pen drive, computer and projector in his teaching.

Integrating ICT into teaching visual arts "*is not a difficult process*", according to T1d. As he explains, because he is familiar with mobile phones, he has a reasonably broad knowledge in using ICT devices. Furthermore, because the learners have easy access to various ICT devices at their houses, it renders easier application of ICT for educational purposes. T1d emphasised that the school allows learners to access the Internet for information concerning visual arts when they are in the computer lab. "*Some of the search engines we use is Google chrome*". This is done to challenge the learners to enhance their knowledge about their subject area. The interviewee T1d emphasised that the visual arts department is highly supportive and currently boasts a projector and a laptop by which the department can access relevant information on Google while at school. On the query how teachers approach their own ICT learning, T1d informs:

"*Based on my syllabus, I use the internet to research and come out with the best methods of handling some topics. I also watch several YouTube videos on various topics*".

In an interview with another senior high school D educationalist on how to interpret the application of technology in the visual arts teaching and learning classroom, T2d asserted:

"*We are in the era where the use of technology abounds, and students are familiar with the use of technology so I think I must also use technology in my teaching*".

The interviewee emphasised that he sees the teaching of visual arts as something that needs time and patience. With time, he said, learners will come to understand the concept of the artwork using technology. This remark underlines a general rule for every innovative approach, idea, reform or change. The reference to "*time and patience*" indirectly stresses their importance in accepting the unknown, i.e., innovation, assimilate it through integration with the existing empirical knowledge, and finally adopt it (Steyn & Sefotho 2021).

Based on the above responses of visual arts teachers, this study has gathered that the participants are highly optimistic and maintain positive beliefs regarding the incorporation of ICT in the visual arts instruction. This important result is voiced throughout the discourse and stressed by the teachers' unquestionable concerns toward their learners' needs. They believe that using ICT will increase learners' understanding, inspiration and satisfaction toward the delivered instruction. In accordance with suggestions from previous researchers (Kale & Goh 2014; Lawrence & Tar 2018), it is important for teachers as agents for educational change to hold optimistic mindsets relating to pedagogical changes (Tondeur et al. 2017). These positive attitudes and believes toward educational reforms could lead to more constructive results and practical application in the visual arts classrooms.

Several studies have revealed that due to its innovative and creative nature, educational technology is essential in the teaching and learning of arts education globally and in Ghana (Kwakye & Ghartey 2019). DeGraft-Yankson (2010:40) commented that "ICT could assist with exploring design problems, enhance artistic decision making and provide new opportunities for learning." DeGraft-Yankson (2010:40) believes that ever since, "the literature has continued to highlight the potential role of ICT in education by supporting visual arts teaching".

5.4 Visual arts' educational content and pedagogical value of ICT integration

1. What are T1a's views on the importance of incorporating ICT in the visual arts curriculum, and how does he believe it can enhance the teaching and learning process?
2. How does T2a view the integration of ICT in visual arts instruction and its impact on the production of artwork, collaboration, and access to information and ideas?

Highlighting the importance of education curricula in visual arts and in the learning and teaching process and outcomes, T1a stated that the incorporation of ICT in the visual arts curriculum makes training easier and more understanding. He further noted that the 21st-century learner should be technologically literate. The advantage is that the learner could compete in the global world that we live in now. To accentuate this point, the interviewee stated that:

"*ICT enhance collaboration among learners and teachers because both operate in the same wavelength and teaching and learning is simplified and made easy through ICT*".

T2a further stated that he uses ICT for teaching purposes every now and then. According to T1a, integrating ICT into teaching visual arts is not challenging because there are simplified tools and resources that can even make the learning process more fun and interesting. T2a noticed that using ICT tools helps in teaching and learning, as it facilitates the artwork production in terms of time, accuracy and interest. He added that integrating ICT in visual arts helps learners to access more information and ideas for their work. To him, ICT enhances collaboration among learners and teachers because it allows both to access and develop the information available to them. T2a believes that integrating ICT into visual arts instruction is easy to implement because it is a tool that can retain data for teaching and provide numerous information possibilities. From his viewpoint, T1b explained that ICT tools, such as the Wacom tablet, make drawing and planning easier. The interviewee added that learners are entertained at the same time when working with ICT tools. As far as ICT is concerned, learners are always eager to learn and practice with these tools because it gets more exciting.

These statements positively relate to a study conducted by Oliver (2000). He asserted that the visual arts education system improves the quality of learning for pupils' benefit and fosters responsibility, helps them mature faster and increase their intellectually growth and knowledge. Furthermore, it also aims at offering amusement to both teachers and learners, during the instruction process. Akudolu (2007) also asserts that when enjoyment is combined with education, it becomes noticeably easier for teachers to communicate new knowledge since the education process is more entertaining.

Another interviewee, T1c, stressed that drawing can be enhanced faster, and more ideas can be generated through ICT through the incorporation of ICT in the visual arts subject. One essential and constructive feature of the use of ICT in the arts process, is the ability to rise

above time and space. This means that ICT can increase the speed of the artwork creation and the planning process. According to Tearle (2003), ICT incorporation in arts education make nonsynchronous learning possible. Tearle explains, by acquiring new knowledge instruction or characterised by a time lag between the training delivery and the learner's response to it. Courses and resources offered online can be accessed 24 hours a day, in the convenience of the receiver. Needless to say, the Ghanaian Curriculum for Basic 7–10, in its ICT-based Common Core Programme of educational delivery encourages learners "to be exposed to various ICT tools around them including calculators, radios, cameras, phones, television sets and computers and related software like Microsoft Office packages - Word, PowerPoint and Excel - as teaching and learning tools" (MoE/GES 2020:xxii). Furthermore, it states that the "learning-centred classroom is a place for the learners to discuss ideas through the inspiration of the teacher… They also research information, analyse and evaluate information" with the purpose to enable learners to be more independent in their learning (MoE/GES 2020:xxi). Phelps, Graham & Thornton (2006) highlight that ICT aptitude and other computer skills are taught specifically better "within a controlled environment such as a computer lab". Synchronous learning has better outcomes when learners use "the same software, the same computers and the same set of steps".

T2c emphasised that they rely more on the Internet because it broadens learners' critical thinking through consultation of more artworks, which assists in developing the comparative viewing of other works globally. This statement stands in line with Galvez's (2018) study, cited by Punzalan (2018:124) which concludes "that learners respond to information differently" and therefore it is "to the advantage of the teachers to use many different formats and modes to teach the subject matter of a lesson". According to Punzalan (2018:124), researchers like Caldwell and Vaughan (2012) and Hartle (2015), have noted that the art education curriculum deserves special attention because of the precious benefits it offers, primarily in "reasoning and critical thinking" (Punzalan 2018:124).

He likewise mentions that art education is one of the essential components of better heights for academic instruction. Punzalan (2018:124) refers to Melnick (2011) who acknowledges several cognitive advantages in visual arts education, such as "creativity, imagination" and "self-expression", which rouse the learners' intellectual understandings by stimulating the mind and training them for higher academic achievement. He suggests that arts education can serve as a forthcoming example for the development of pedagogically useful aptitudes and

practices. Based on arts education experiences, expert researcher, Eisner (2000), also cited in Punzalan (2018:24), identified the following four pedagogically strong impacts:

- Learners experience "the process of putting ideas and expressions into a form or creation."
- Learners "gain greater perceptual abilities and become more analytical."
- Learners "see interconnectedness between arts, culture and history."
- Learners "demonstrate perseverance through ambiguity." Punzalan (2018:24).

An inclusive arts education package should offer engaging and innovative training material that increase learners' critical and creative thinking skills as well as their cognitive and understanding skills. It should offer learners possibilities to interact and be creative in the field of the arts. "The arts are attributed with expanding the boundaries for knowing, learning, and comprehending culture 'holistically, naturally, and creatively, thus deepening understanding of self, others and the world'" (Karavoltsou 2015:159)

By extending visual arts beyond the use of traditional media, ICT offers many opportunities for unique creativity in the classroom as stated by Brown 2002 and Stankiewicz 2004. As early as the 1980s (Crowe 1988) it was noted that ICT could help with designing, improve artistic judgment and assessing and present fresh learning opportunities. Since then, research has emphasized how ICT may help the teaching of visual arts (Long 2001:262; Wilks et al. 2010).

How does T1d view the use of technology in facilitating the presentation and distribution of visual arts work compared to traditional methods?What are the specific ways T1d believes technology can improve the speed and effectiveness of visual arts teaching and learning compared to traditional methods?

In his turn, T1d explains how technology makes visual arts teaching and learning easy, as learners learn through a more tangible approach. The interviewee continued by stressing how technology can assist the user-teacher to work faster, as ICT also allows for modification in the completion of an artwork. For instance, by using a webcam, one can work faster and on a broader platform since it allows users to upload their artworks through social media for people globally to see. Compared with the traditional way of physically viewing artworks at an art gallery, a virtual gallery is in many ways more convenient (Wilks et al. 2010:56). People can

visit the platform multiple times, and at any time, seven days a week, without having to physically view the artworks at a specific location. People nowadays view the works online and even purchase them online. According to T1d, ICT enhances collaboration among learners and their teachers. Since we are in a technological world where learners already have knowledge in ICT, they are immediately more interested in their teacher's instructions who uses technology relevant to the 21st-century teaching of visual arts creativity skills. Thus, there is a solid, interactive relationship between teacher and learner where learner engagement is captured.

What are the benefits T2d sees in using technology in the teaching and learning of visual arts compared to traditional methods?

Like his colleagues, T2d stressed how technology facilitates the teaching and learning of visual arts because learners do not study art theory. He stated that technology facilitates teachers' work, especially in presenting their lesson efficiently and lively, whereas, in practical lessons, ICT enables for changes to be made to artwork. In terms of time and space, for T2d it is important to have a webcam that may assist the learners to work faster since it allows them to post their artworks via the Internet, get feedback (positive and negative), rework and share it with people globally via social media. This is different from the typical conventional method of obtaining a space in an art gallery to display one's artworks.

The above responses offer me enough but crucial elements to establish the effectiveness and impact of ICT have on creative arts education, which is valuable when properly employed. Moreover, the results from the interviewees can successfully be linked to Hopper (2016), who posited that ICT has already provided opportunities for changing and complementing the arts education curriculum. As for learning, Lankshear Snyder and Green (2000) argue that it would be made more effective, and its output enhanced if a teacher selected the most appropriate educational technology. Likewise, Smith, Hardman and Higgins (2006:32-33, 443-457) believe that ICT is essential for promoting quality teaching and learning. Furthermore, ICT can promote problem-solving and cooperative methods in the classroom. In other words, ICT offers real-world pragmatic knowledge through mock-ups and imaginative demonstrations that could have never been possible before in the traditional classroom setup (Mohd Khairezan 2014; Konak 2018: 53). Becker (2000) cited the need for computers to be seen as problem-solving machines, able to solve regular curriculum and typical school problems, especially issues concerning learning, instructing or school administration.

Consequently, apart from improving the learner-centred learning approach where the learners form their knowledge, meaning and solutions (Chou, Chang & Chen 2017), ICT integration into art classrooms in Ghana, I believe, will enhance the learners' creativity by developing their critical thinking skills and expressing their ideas artistically with better accuracy. In conclusion, according to the interviewees, ICT could assist with exploring design problems, enhance artistic decision making and provide new opportunities for learning in terms of creative thinking, solution finding, controlled processing and producing.

5.5 Pedagogical challenges in the application of ICT integrated approaches

Educational systems might turn into a complex pedagogical process in its practical application, especially when the system is ideologically planned. Aiming at expected positive outcomes, the system's implementation could encounter some challenges.

On current challenges faced by a visual arts teacher in teaching and learning, T1a stated a non-availability of technology labs, while T1b indicated a lack of space, a lack of equipment and resources and a lack of audio-visual teaching and learning aids. Regarding the availability and quality of resources in schools, specifically for the visual arts class, T1a states:

"*We lack most of the resources. Teachers use their personal tools and resources to teach*".

According to T1a, the lack of tools and materials and proper refurbished studios for practical applications are his current challenges as a visual arts teacher in fulfilling his instruction duties. T1b referred to a lack of resources, limited classroom space, limited ICT tools and materials as factors that negatively influence the quality of teaching and learning visual arts at school. This respondent drew attention to negative factors to demonstrate a severe challenge in their pedagogical approach. According to T1b, the factors considerably influencing a learner's performance in terms of motivation and performance in visual arts at senior high schools are:

"*… lack of studio, limited time for studying and practicing art, inadequate tools and materials, lack of audio/visual tools for teaching*".

In responding to the question on the current challenges faced as a visual arts teacher in teaching and learning, T2b explained that the challenges with the teaching their subject is a lack of textbooks and, when requisitions are made, the administration refuses to honour it.

The teacher went on to say that because most teachers were born before computers, their approach to their own ICT learning is quite inadequate. On factors that significantly affect learners' motivation and performance in visual arts in senior high schools, the interviewee T2b emphasised that teachers in other areas of learning pass derogatory comments to demean the subject when it is their turn to teach. This, to him, adversely affects learners' motivation. On availability and quality of resources in his school, the interviewee stressed there is a lack of resources in the school.

T1c emphasised the lack of practical experience and inadequate materials for efficient work performance, which can be considered a current challenge faced by a visual arts teacher in the teaching and learning process. He again stressed that learners tend to play too much and, consequently, less drawings are made manually.

In the interview with T2c on current challenges faced as a visual arts teacher in the teaching and learning process, the interviewee said:

"*Teaching the practical aspect of visual arts these days is it's becoming more difficult because there are no materials in the school. Again, there is lack of tools*".

Most often, due to a lack of materials for teaching, T2c emphasised that he relies on pictures and videos to show learners how such items are done. He again stressed that a lack of materials in the teaching and learning of the visual arts subject is a demotivating factor, but he hopes that, with time, things will improve.

As current challenges faced as a visual arts teacher, T1d outlined the following:

"Lack of some students' interest in the visual arts subject, lack of materials in teaching the visual arts subject, example, laptop and projectors, students also do not have money to purchase some of the materials for themselves. Examples textbooks, laptops".

On factors that significantly affect learners' motivation and performance in visual arts in senior high schools, the interviewee recounted the following factors:

"Unqualified teachers teaching them, wrong methods used in teaching the visual arts subject in high schools. This is because teachers cannot integrate ICT with the traditional methods of teaching visual arts, lack of ICT facilities in the school. Example computers, projectors, application software's for designing, lack of student interest in the visual arts subject".

T2d said the following about the current issues he faces as a visual arts instructor in terms of teaching and learning:

"Lack of some students' interest in the visual arts subject, lack of materials in teaching the visual arts subject, example, laptop and projectors, students also do not have money to purchase some of the materials for themselves. Examples textbooks, laptops"…

The challenges, as enumerated by interviewees, correlate with Mohd Khairezan and Au (2017) who revealed that despite all the advantages derived from the integration of ICT in visual arts, several researchers have pointed out that ICT integration into art classrooms were far from reaching its target. Roland's (2010) research on art teachers' priority level of ICT integration in the art classroom revealed that more than 40% contemplate ICT integration as relative significant while a third stated that it is unimportant. Furthermore, research by Coleman and Cramer (2015) showed that many art teachers are unwilling to embrace ICT into visual art classrooms due to the fear that it will decrease learners' artistic expression, creativity, and thoughtful use of art forms. This negative attitude towards the integration of ICT among art teachers is a major problem that requires careful attention from researchers and calls for an extensive examination. (Mohd Khairezan 2014; Konak 2018; Roland 2010).

As mentioned in Chapter Two, ICT integration in visual arts instruction has created some challenges, i.e., teachers' traditional ideologies concerning aesthetics, and their beliefs about the incompatibility between educational technology and art itself, and have been identified as barriers to adopting ICT (Matthew et al. 2002; Wood 2004). Despite the significances of technology in the art subject, less than 50% of teachers and learners in the Cape Coast Ghanaian senior high schools has unlimited access to the school computers.

5.6 Can the integration of traditional and innovative pedagogical approaches facilitate developing the current visual arts skill techniques?

A traditional academic training in the arts includes the study of "drawing, painting, printmaking, photography, and sculpture" (NAEA, n.d., para. 2). These have been the basic skill sets imperative to artistic foundation and growth. The practice of these techniques improves observational drawing skills and perceptual abilities, training learners to see the world through an artistic eye. However, the modern media arts include "3D printers, laser cutters, easy-to-use design software, and desktop machine tools, along with freely available

information about how to use, modify, and build upon these technologies" (Sweeny 2018:349).

Elaborating on this theme, T1a emphasised that traditional and innovative pedagogical approaches sharpen learners' practical skills, thereby helping them to gain the opportunity of becoming excellent artists. To the interviewee, the traditional way of teaching and learning is perfect for developing skills and techniques. He noted that the traditional way of teaching and learning enhances creativity.

Another interviewee, T2a brought to light that the traditional pedagogical approach enhances the acquisition of the necessary foundations before branching off into experimentation. Considering the relevant controversy in Ghana, he emphasised that the traditional way of teaching and learning visual arts fosters and enhances creativity rather than suppressing it. He further stressed that educational technology could facilitate current visual arts skill technique development because it will make learners more proactive and innovative.

From his viewpoint, T2b indicated that the traditional way of teaching and learning the subject offers opportunity for skill development, empirical knowledge and expertise. Teachers and learners can apply this acquired expertise creatively at any given occasion. As that expertise grows, so does the self-esteem and confidence.

Accentuating how educational technology can facilitate current visual arts skill technique development, T2c added that combining traditional and innovative pedagogical approaches is a good starting point and could grow if more ICT devices are offered:

"*Currently, the school does not have much of the necessary ICT tools / devices. We have our phones and projector. Traditionally we do our normal casting and drawing. We believe when we get much of the ICT devices, we will combine them well*".

Commenting on the positive factors in the traditional way of teaching and learning visual arts, the interviewee said:

"*Teacher expertise is important. If we model good practice as practitioners in the arts it means we have credibility and therefore a natural authority in the classroom. Students need to see us demonstrate our own skills, then they know that we have the knowledge and experience to help them develop their own*".

Further, T2d made known that combining traditional and modern technology helps learners acquaint themselves with modern trends. Accentuating on positive factors in the traditional way of teaching and learning visual arts, the interviewee said:

"*Not until I was in my high school days did I learn that one can actually be taught to draw. Like so many others, I had been led to believe that it took inborn talent and creativity* - unteachable. *Bravo to this school for taking on the challenge of teaching all of their students how to draw with pencil. It is a wonderful skill that enriches lives*".

The traditional approaches to visual arts instruction include training in drawing, printmaking, photography, sculpture and painting. These long-standing mediums that have spanned centuries, according to the National Visual Art Standards (n.d., para. 2), are the standard modes and techniques taught in studio art classes, foundation courses and basic curricula across the country. They have been around for centuries and have become the established canon of art.

This study's results can be related to Mishook and Kornhaber's (2006) study where it is stated that arts education is essential because it improves performance. They claimed that it improves learning skills, school attendance, critical thinking skills and creativity. A good arts education is built on and reflects recognition of the specific and unique ways in which the arts shape people's thinking skills and adds value to their lives (Meyers & Scripp 2007). The noteworthiness of creative art is immeasurable and innumerable. Booth (2016) asserted that the techniques are also ways of learning, exploring, responding, revealing, demonstrating, imagining, depicting and making meaning. They belong to the school curriculum because they can find their way in the minds and hearts of young learners lifelong through a feeling of familiarity built on accepting the new, integration with the inner self and its assimilation.

The above responses provide a comprehensive answer to the argument put forward by Hicks (1993) that learners must be wise consumers, familiar with how the mass media operates. Visual arts education is critical in preparing learners as visually literate and critical members of society (Schwartz 1991; Brown 2002). Furthermore, the results of this study add to previous concepts, stating that using digital media will expand new career opportunities, which will be opened for visual artists (Taylor 1999). According to a similar remark, learners with knowledge, skills and proficiency in digital art and design will be well situated to obtain employment in commercial visual arts contexts, such as advertising, film, animation and other

computer graphic industries (Matthews 1997; Taylor 1999). Moreover, web 2.0 technologies, such as Second Life and Flickr, together with the expanding games industry, represent environments where digital visual art and design skills provide new opportunities for self-expression and an enhanced commercial potential.

However, in my view as a researcher on the subject matter, drawing can be taught as an essential, integral part with the digital art and design instruction. In relation to combining traditional and innovative pedagogical approaches, the responses from the interviewees echo Makki et al.'s (2018) viewpoint, which supports ICT integration into art classrooms, which, under the support of the school administrators could lead to successful outcomes.

The interviewed visual arts teachers showed that school administrators' unsupportive behaviour and misunderstanding toward the needs of the subject for innovative applications in their teaching approaches have demoralised teachers for integrating ICT. The need for constant and relevant ICT-related specialised development courses have also been mentioned. As addressed by previous scholars (O'Neal, Gibson & Cotton 2017; Makki et al. 2018), numerous ICT specialised development courses only highlight the user's skills to operate computer applications, which have added to teachers' disinterest to attend. Instead of starting with the acquirement of basic ICT and technological skill orientation, ICT professional development courses are based on a pre-existing level of TK and experience, including a comprehensive pedagogical content (Tondeur et al. 2017).

According to Lallana and Margaret (2003) cited in Adesote and Fatoki (2013:2156), ICT include "computers, communications equipment and the services associated with them", meaning that ICT is not only "an applications and systems" but is also considered "as skill for life".

It is imperative that skills in traditional and technology approaches in visual arts be taught concurrently because these skills will be used in the everyday life of learners. The current visual arts curriculum does not provide for an inclusion of traditional and technology approaches in the classroom.

Promoting the co-existence between innovative technologies and traditional art processes, Wang (2002) and Wood (2004) stress the possibilities of art expression, communication and perception in combining existing traditional ways with innovative approaches. With an ever-increasing emphasis on still and animated imagery, symbols and iconography in society, the

analysis, interpretation, extrapolation and evaluation of visual representation have become just as crucial as artistic creations. Therefore, for learners to be wise consumers, familiar with how the mass media operates, visual arts education has a vital role to play in preparing learners as visually literate and critical thinking members of society (Schwartz 1991; Brown 2002).

Table 5.2 Access and usage of ICT tools for senior high school A

Q/N	Types of ICT Tools	Use for Teaching		Use for Lesson Preparation		Use for Personal Development	
		Yes	No	Yes	No	Yes	No
25	Mobile Devices	√		√		√	
26	Personal Computer	√		√		√	
27	Internet	√		√		√	
28	Intranet (school network)	√			√	√	
29	Digital Camera	√			√	√	
30	Projector	√			√	√	
31	CD/DVDs		√		√		√
32	Printer		√		√	√	
33	Scanner		√		√		√
34	Television		√		√	√	
35	Smartboard & Whiteboard Apps. (Jamboard, Educreations)		√		√		√
36	Microsoft Office (Word, Excel, Access, PowerPoint,	√		√		√	
37	Software (Photoshop, CorelDraw, Sketchpad)	√		√		√	
38	Social Media (WhatsApp, Twitter, Skype, Facebook, Instagram, Messenger)	√			√	√	
39	Video Websites (YouTube, Netflix, Vimeo)	√		√		√	
40	Video Conference (Zoom, Google meets, Teams)		√		√		√
	Cloud Storage Service (OneDrive, iCloud)		√	√		√	
42	Learning Management System (LMS) (Google Classroom, Moodle, Blackboard)		√		√		√
43	Online word processors (Google Docs, Zoho Writer)		√		√		√
44	Note Sharing (Evernote, OneNote)		√		√		√

Source: Field interview (January 2022)

Table 5.2 displays data on the access and usage of ICT tools for senior high school A. the table shows that the interviewees (teachers 1 and 2) use mobile devices, personal computers, the Internet, the Intranet (e.g., the school's private and internal network), digital cameras, projectors and Microsoft Office programmes (Word, Excel, Access, PowerPoint, Loom). For visual arts teaching, various software programmes, such as Photoshop, CorelDraw and Sketchpad are used. For social media applications, the most used are WhatsApp, Twitter, Skype, Facebook, Instagram and Messenger. Video websites and media platforms (YouTube, Netflix, Vimeo) are easily accessible and were consulted for pedagogical purposes. According to the above data, the interviewees from senior high school A do not use CD/DVDs, printers, scanners, televisions, smartboard and whiteboard applications, such as Jamboard and Educreations, video conference (Zoom, Google meets, Teams), cloud storage service (OneDrive, iCloud), learning management system (LMS) (e.g., Google Classroom, Moodle, Blackboard), online word processors (Google Docs, Zoho Writer) and note sharing (Evernote, OneNote) for teaching.

This might be partly due to the inaccessibility of such tools or the unimportance of some tools in the world of the arts. Studies have disclosed that teachers find it challenging to integrate technology in their teaching and learning approaches because the technologies they need are either not offered or not easily available to them or their learners (Ely 1999).

In their list of inhibitors, Mumtaz (2000) and Kwakye and Ghartey (2019) have identified negative predisposing factors, such as resistance to administrative change and outside intervention caused by time management problems, a lack of support from the administration and teachers' professional and personal perceptions. Mbodila and Muhandji (2012) argue that traditional approaches of teaching and learning involve the direct flow of information from teachers to learners, creating a comfort zone routine. This sense of secure steadiness tends to distrust and a priori reject any innovative direction toward challenges and unfamiliar changed circumstances threatening the established familiar reality.

On lesson preparation, the data has it that interviewees from senior high school A use mobile devices, personal computers, the Internet, Microsoft Office (Word, Excel, Access, PowerPoint, Loom), software (Photoshop, CorelDraw, Sketchpad), video websites (YouTube, Netflix, Vimeo) and cloud storage services (OneDrive, iCloud). The rest of the tools, as displayed by the table, are not used by the interviewees for lesson preparation.

On **Personal Development**, the table shows that respondents use mobile devices, personal computers, the Internet, the Intranet (school network), digital cameras, printers, televisions, Microsoft Office (Word, Excel, Access, PowerPoint, Loom), software (Photoshop, CorelDraw, Sketchpad), social media (WhatsApp, Twitter, Skype, Facebook, Instagram, Messenger), video websites (YouTube, Netflix, Vimeo) and cloud storage service (OneDrive, iCloud). However, tools such as CD/DVDs, scanners, smartboard and whiteboard apps (Jamboard, Educreations) and video conferences (Zoom, Google meets, Teams, etc.) among others are not used for personal development according to the interviewees. Note that the interview was conducted at a time when lockdown during the COVID-19 pandemic was not yet imposed in the Accra and Kumasi districts in Ghana. I believe that during the lockdown period, teachers would have forcefully adopted teaching online activities.

Table 5.3 Access and usage of ICT tools for senior high school B

Q/N	Type of ICT	Use for Teaching		Use for Lesson Preparation		Use for Personal Development	
		Yes	No	Yes	No	Yes	No
25	Mobile Devices	√			√	√	
26	Personal Computer	√		√		√	
27	Internet	√		√		√	
28	Intranet (school network)	√		√	√	√	
29	Digital Camera	√			√	√	
30	Projector	√			√	√	
31	CD/DVDs	√			√	√	
32	Printer	√		√		√	
33	Scanner	√		√		√	
34	Television	√			√	√	
35	Smartboard & Whiteboard Apps. (Jamboard, Educreations)	√		√		√	
36	Microsoft Office (Word, Excel, Access, PowerPoint,	√		√		√	
37	Software (Photoshop, CorelDraw, Sketchpad)	√		√		√	
38	Social Media (WhatsApp, Twitter, Skype, Facebook, Instagram, Messenger)	√		√		√	
39	Video Websites (YouTube, Netflix, Vimeo)	√			√	√	

40	Video Conference (Zoom, Google meets, Teams)	√			√	√	
	Cloud Storage Service (OneDrive, iCloud)	√			√	√	
42	Learning Management System (LMS) (Google Classroom, Moodle, Blackboard)	√		√		√	
	Online word processors (Google Docs, Zoho Writer)	√		√		√	
44	**Note Sharing (Evernote, OneNote, etc.)**	√		√		√	

Source: field interview, (January 2022)

Data on Table 5.3 displays the access and usage of ICT tools by interviewees from senior high school B. The interviewees use all tools for teaching. On lesson preparation, tools such as personal computers, the Internet, the Intranet (school network), printers, scanners, and smartboard and whiteboard apps (Jamboard, Educreations, etc.) are primarily used for pedagogical purposes. Microsoft Office (Word, Excel, Access, PowerPoint, Loom), software (Photoshop, CorelDraw, Sketchpad), social media (WhatsApp, Twitter, Skype, Facebook, Instagram, Messenger), learning management systems (Google Classroom, Moodle, Blackboard), online word processors (Google Docs, Zoho Writer) and note sharing (Evernote, OneNote) are used. On the use for personal development, the data reflect that the interviewees (teachers 1 and 2) from senior high school B use all the tools.

Table 5.4 Access and usage of ICT tools for senior high school C

Q/N	Type of ICT	Use for Teaching		Use for Lesson Preparation		Use for Personal Development	
		Yes	No	Yes	No	Yes	No
25	Mobile Devices	√			√	√	
26	Personal Computer	√		√		√	
27	Internet	√		√		√	
28	Intranet (school network)	√		√	√	√	
29	Digital Camera	√			√	√	
30	Projector	√			√	√	
31	CD/DVDs	√			√	√	
32	Printer	√		√		√	

33	Scanner	√		√		√	
34	Television	√			√	√	
35	Smartboard & Whiteboard Apps. (Jamboard, Educreations)	√		√		√	
36	Microsoft Office (Word, Excel, Access, PowerPoint, Loom, etc.)	√		√		√	
37	Software (Photoshop, CorelDraw, Sketchpad)	√		√		√	
38	Social Media (WhatsApp, Twitter, Skype, Facebook, Instagram, Messenger)	√		√		√	
39	Video Websites (YouTube, Netflix, Vimeo)	√			√	√	
40	Video Conference (Zoom, Google meets, Teams)	√			√	√	
41	Cloud Storage Service (OneDrive, iCloud)	√			√	√	
42	Learning Management System (LMS) (Google Classroom, Moodle,						
43	Online word processors (Google Docs, Zoho Writer)						
44	**Note Sharing (Evernote, OneNote)**						

Source: Field interviews (January 2022)

Table 5.4 displays the access and usage of ICT tools by the interviewees from senior high school C. According to the data, the interviewees (teacher 1 and 2) use mobile devices, the Internet, the Intranet (school network), projectors, software (Photoshop, CorelDraw, Sketchpad), video websites (YouTube, Netflix, Vimeo) and learning management systems (Google Classroom, Moodle, Blackboard) for teaching. ICT types such as personal computers, digital cameras, CD/DVDs, printers, scanners, televisions, smartboard and whiteboard apps (Jamboard, Educreations), among others, are not used for teaching.

The table shows that ICT types, such as mobile devices, the Internet, software (Photoshop, CorelDraw, Sketchpad), video websites (YouTube, Netflix, Vimeo) and learning management systems (Google Classroom, Moodle, Blackboard) are used for lesson preparation.

On personal development, the table shows that the interviewees use mobile devices, the Internet, software (Photoshop, CorelDraw, Sketchpad), video websites (YouTube, Netflix,

Vimeo) and learning management systems (Google Classroom, Moodle, Blackboard). The rest of tools listed are not used.

Table 5.5 Access and usage of ICT tools for senior high school D

Q/N	Type of ICT	Use for Teaching		Use for Lesson Preparation		Use for Personal Development	
		Yes	No	Yes	No	Yes	No
25	Mobile Devices	√			√	√	√
26	Personal Computer	√		√		√	√
27	Internet	√		√		√	√
28	Intranet (school network)	√		√	√	√	√
29	Digital Camera	√			√	√	√
30	Projector	√			√	√	√
31	CD/DVDs	√			√	√	√
32	Printer	√		√		√	√
33	Scanner	√		√		√	√
34	Television	√			√	√	√
35	Smartboard & Whiteboard Apps. (Jamboard, Educreations)	√		√		√	√
36	Microsoft Office (Word, Excel, Access, PowerPoint, Loom)	√		√		√	√
37	Software (Photoshop, CorelDraw, Sketchpad)	√		√		√	√
38	Social Media (WhatsApp, Twitter, Skype, Facebook, Instagram, Messenger)	√		√		√	√
39	Video Websites (YouTube, Netflix, Vimeo)	√			√	√	√
40	Video Conference (Zoom, Google meets, Teams)	√			√	√	√
41	Cloud Storage Service (OneDrive, iCloud)	√			√	√	√
42	Learning management systems (Google Classroom, Moodle, Blackboard)	√		√		√	√
43	Online word processors (Google Docs, Zoho Writer)	√		√		√	√
44	Note Sharing (Evernote, OneNote)	√			√	√	√

Source: Field interviews (January 2022)

Table 5.5 displays the access and usage of ICT tools by the interviewees from senior high school D. From the table above, the interviewees use mobile devices, the Internet, the Intranet

(school network), digital cameras, projectors, printers, televisions, Microsoft Office (Word, Excel, Access, PowerPoint, Loom), software (Photoshop, CorelDraw, Sketchpad), social media (WhatsApp, Twitter, Skype, Facebook, Instagram, Messenger), video websites (YouTube, Netflix, Vimeo) and cloud storage services (OneDrive, iCloud) for teaching. Tools such as personal computers, scanners and smartboard and whiteboard apps (Jamboard, Educreations), among others, are not used for teaching.

For lesson preparation, the data reveals that ICT types, such as mobile devices, personal computers, the Internet, the Intranet (school network), digital cameras, printers, scanners, television, Microsoft Office (Word, Excel, Access, PowerPoint, Loom), software (Photoshop, CorelDraw, Sketchpad), social media (WhatsApp, Twitter, Skype, Facebook, Instagram, Messenger), video websites (YouTube, Netflix, Vimeo) and cloud storage services (OneDrive, iCloud) are used. The rest, as listed on the table, are not used.

Regarding personal development, mobile devices, personal computers, the Internet, digital cameras, printers, scanners, televisions, Microsoft Office (Word, Excel, Access, PowerPoint, Loom), software (Photoshop, CorelDraw, Sketchpad), social media (WhatsApp, Twitter, Skype, Facebook, Instagram, Messenger), video websites (YouTube, Netflix, Vimeo), video conference (Zoom, Google meets, Teams), cloud storage services (OneDrive, iCloud), online word processors (Google Docs, Zoho Writer) and note sharing (Evernote, OneNote) are used.

The responses from various interviewees, as seen from the tables, corroborate with the position of Ashford et al. (2002) who argued that drawing and painting software, digital still and video cameras, electronic portfolios, scanners, colour laser printers, samplers and sound mixers, image manipulation, video editing, 3D animation, the Internet and website design can support learners' imaginative creations or manifestations (Neylon 1996; Ashford 2002; Brown 2002).

Furthermore, as a medium for exploring solutions to design problems (Matthews 1997; Wilks et al. 2012:55, 59), learners can record and save ideas quickly, manipulate lines and colour, modify and incorporate images and employ motion (Hubbard & Greh 1991). ICT allows learners who might not possess skills with traditional media to focus more on the message and less on execution of artworks, enhancing self-expression (Long 2001; Wang 2002; Wood 2004). According to Wilks et al. the use of ICT in the visual arts classroom decreases learners' anxiety and "promotes experimentation, and corrects mistakes more easily" (2012:60). The

authors argue that many art teachers believe that making mistakes is valuable, and that anxiety can be beneficial. They emphasise that getting hands-on with the creative process and experimenting is encouraged in visual arts classrooms, as it can lead to new discoveries. They acknowledge that while technology can't replace traditional art techniques, it expands the ways in which art can be expressed, communicated, and perceived (Wilks et al 2012:60).

5.7 Conclusion

In conclusion, the interviews confirm that these visual art teachers have demonstrated positive viewpoints, opinions and beliefs towards technology integration into the traditional visual arts classrooms. The results indicate that most of the interviewed teachers possessed a prominent level of confidence. Furthermore, this study's findings show that teachers use the full potential of ICT (when and if available) in their instruction process. They use ICT commonly as a teaching tool, especially in delivering their instructional materials. Teachers, being at the centre of any educational changes, have a goal to ensure the successful integration of ICT in their teaching and learning approaches. The need for their positive attitudes and faith toward ICT are crucial and pressing for attention.

Furthermore, comprehensive professional development courses must be offered to teachers continuously. It is hoped that through relevant professional development seminars and courses, teachers will be exposed to more meaningful and creative uses of ICT. Apart from enhancing teachers' confidence level, this initiative must be considered as one of the mechanisms in ensuring the full potential of ICT uses among teachers. Furthermore, cooperation from school administrators and the support from the Ministry of Education in ensuring the availability of ICT-related facilities are essential in making ICT integration a successful endeavour. Besides, teachers must possess an instilled positive mindset toward integrating ICT with their previously conventional teaching and learning systems to guarantee the productive use of cutting-edge ICT-course delivery, mediated by educators and teachers and learners accordingly.

5.8 Classroom observations and photographs of learners' visual diaries/ drawing books

5.8.1 Senior high school A: Classroom observation

Table 5.6 Observations during classroom lessons

Topic	Findings/Comment
Planning and preparation	Preliminary sketches, preparation of clay, which include dry and wet methods, kneading and wedging, and the slab method
Time allocation per activity	Six hours a day for five days
Teaching /classroom arrangement	Learners were placed in groups
Mode/method of teaching	Brainstorming and demonstration
Technology used in class	Computers to guide the learners for their preliminary sketches.
Effective application of technology by teachers	Using Coral Draw and Adobe Photoshop by the teacher to draw the sketches helped the learners to draw their sketches using a computer
Teachers' experience/technology used	Six years of teaching ceramics. The teacher used Coral Draw and Adobe Photoshop in their drawings.
Resources used—available software applications, computer devices, instructional materials, e.g., brush paint and others	Coral Draw and Adobe Photoshop were used to draw the preliminary sketches The instructional materials are clay, water, guide sticks, rolling pins, sack boards and the ceramics textbook
Assessment materials	Preliminary sketches, preparation of clay, method used, and measurement of the artefact
Learners' participation (regarding TPACK, which involves learning, attention and problem solving through network participation)	Learners were actively involved because it is a practical oriented course. Learners were also placed in groups so that everybody can take part
Feedback from learners during lessons (regarding TPACK)	Learners could capture all the steps in producing the work.
Compared to using traditional tools, to what extend is modern technology used?	Learners were spending a lot of time using the traditional tools, while using modern technology made the drawings easy
Classroom management	Conducive environment
Lesson delivery	
Presentation challenges	Most learners did not have all the tools to produce the work

5.8.2 Observation in various schools

The lesson observations were conducted in four schools, selected purposefully for this study. Most observations occurred during the practical art lessons and others during the theory lessons, either in the arts classrooms or art studios. For ethical and confidentiality purposes, pseudo codes were given to each school, namely, Schools A, B, C, and D.

In my capacity as a researcher and teacher with empirical knowledge on the topic, I observed the visual arts classroom teaching and learning within the context of the TPACK research framework. The purpose of the observations was to explore how teachers integrated ICT tools with the traditional medium during their theoretical and practical lessons. To this end, I applied a classroom observation schedule focusing on the following aspects: how the topic was introduced, which activities learners were given and how they were involved, which approaches were implemented in instructing the development of the creative process, what

type of activities were learners given, and on myself, how to critically to assess how technology was integrated with the traditional approach in a visual arts class.

- **School A Classroom Observation**

Background

Senior high school A started as a private girls' senior high school in the Akuapem region, founded in 1957. In 1963, the school was absorbed into the public system as a day school. Currently, it has a residential status i.e., day and boarding learners. The school's primary mission is to maintain self-discipline and moral uprightness to improve discipline and provide a friendly environment for effective teaching and learning and to develop good infrastructure for the school in terms of proper landscaping and regular maintenance of the school building. As part of the visual arts curriculum, various programmes are offered in each school. These programmes include textile, picture making, graphic design, jewellery, ceramics and general knowledge in art. In school A, the visual arts programmes taught are ceramics and jewellery. During the observation, the two teachers, T1a and T1b, combined their jewellery and ceramics classes using one space, i.e., the art studio. This meant that the workspace was packed (48 learners). Combining the practical classes was not unusual and seen as a normal procedure. It was also decided to combine the classes for this study.

The practical task

The classroom setting was as follows: the 48 learners were arranged in groups of four. Each group was positioned in a circular formation by the teacher. I observed the learners in their learning environment and later examined four learners' visual diaries and final works.

As part of the brief, under the topic, Inspired by Nature, the learners were given two tasks to work on: design and produce a plate to hold bread, and design and produce a fashionable metallic belt inspired by various fruit or vegetables.

The instructional materials were textbooks, poster colours, brushes, pencils, rulers or guide sticks, coloured pencils, rolling pins and tracing paper. Added materials for the final product were clay and water. The technology tools made available for learners' use were the teachers' mobile phones, computers, laptops, projectors and software programmes, i.e., Corel Draw and

Photoshop. The time allocation for this task was sixty minutes, but, as for the project in its totality, the learners were given one week to complete.

The learning objectives of the brief were to evaluate learners' tool manipulating skills (psychomotor skills). The Curriculum Research Development Division (CRDD 2010:ii) highlights the primary aims of teaching the jewellery and ceramics syllabus:

- appreciate jewellery/ceramics as an integral part of industrial development and create opportunities to earn a living
- develop the scope for creativity using indigenous (i.e., traditional) and contemporary tools and materials in jewellery design
- apply basic entrepreneurial skills necessary for establishing and managing a jewellery or ceramics workshop or enterprise
- develop learners' artistic and technical skills using tools and materials effectively to create functional and aesthetic jewellery and ceramics
- acquire perceptive and analytical skills through the processes of self-expression and communication

I observed the learners' planning and preparation as they worked through the first stages of the development process. The method employed by the visual arts teachers was a linear approach and included different informal steps the learners had to follow during their development stages and included collecting organic elements form nature (leaves, branches) or retrieving pictures from the internet to be used as a source of inspiration, brainstorm ideas or conceptualisation of ideas, development of drawings, demonstration by teachers, followed by a class discussion. Learners showed their ideas and received feedback on how to improve or rework their final ideas.

The teachers from School A guided some learners on how to better their preliminary sketches using a computer. The four learners on which I focused had drawn their initial sketches and shown them to their teachers for constructive feedback before developing them further. T1a highlighted that all their school's art department teachers had several years of teaching experience. With that, T1a indicated that he could use Coral Draw and Adobe Photoshop software and encouraged the learners to use these for improving their drawings.

Using technology in the art studio

Both teachers used the technology tools effectively, enabling easy understanding for the learners by first doing a quick demonstration before guiding the learners while they were using the tools. As part of the demonstration, T1a started the lesson by downloading a short video from the internet and showed it to the class via a projector. The learners participated actively by asking questions on how to develop ideas from objects while watching the video, making the lesson effective. Learners immediately started experimenting after watching the video. The teachers followed an inquiry-guided approach to achieve their aim: the lesson was sequenced in an engaging and meaningful manner. Furthermore, the teacher–learner involvement links to the TPACK framework, which involves learning and problem solving through specific technological tools (hardware, software, applications, network participation) and which are most suitable for the task at hand. On their application in terms of its pedagogical value, effective learning and its connection to technology, Koehler and Mishra (2013:101) emphasise the importance of teachers' understanding of the content and pedagogy, and how they interact with one another.

To this end, by comparing the use of modern technology to traditional tools, it was observed that combining the former with traditional tools was effective in this specific lesson. Using technology was highly effective, making teaching and learning easy and fun at the same time; hence, the lesson delivery was successful. In the case of classroom management, the teachers had total control of the classroom—learners were organised into groups for easy control. Those learners who worked with traditional tools could continue while other learners worked with technological tools. Both teachers were very involved in the process and employed the following approaches:

- applying multimedia and technology
- used up to date teaching materials and technology
- directing a co-operative learning approach

However, some challenges were observed. By combing the classes, there was inadequate space for learners to move freely. The classroom's temperature was heated due to the number of learners, which posed another risk factor in context of the COVID-19 pandemic.

From observation to realistic drawings

In the context of the theme, based on the inspiration of a leaf, learners were tasked to design a plate to hold bread. During the observation, I noticed that some learners collected leaves

that were easily available in their natural surrounding while a selected group took photos and most searched for pictures of leaves from the internet. Both examples were used as a source of inspiration to create their drawings and later, their designs for bread plates. The learners, by observing their objects (leaves or pictures of leaves) immediately started drawing them. As part of the drawing process, drawing by observation is a crucial exercise to start with. Edwards (1999:102) states:

> By slowing down and closely observing something, personal expression and comprehension occur in ways that cannot occur simply by taking a snapshot […]. In this way, again paradoxically, your careful observation and depiction of your subject give the viewer both the image of your subject and an insight into you. In the best sense, you have expressed yourself.

From observation to the realistic drawings of leaves, learners developed them into rough simplified (stylised) sketches and finally, into their final designs (of plates), some unique and some a little naïve. Regarding the other task, i.e., to design and produce a fashionable metallic belt inspired by various fruit or vegetables, learners picked any fruit of their choice and started working on their concepts, followed by realistic drawings. The same procedure as above was followed: observe, draw, comment, improve. The final design (usually stylised) was to be used to produce a metallic belt.

Some notes during my observation

As for the four learners' source/drawing books, the following aspects were studied: the number of activities per component, such as idea development, preliminary sketches, miniature of work, and final work, which were observed and photographed. The number of activities per component depended on the learners' creative capabilities. Not all learners worked at the same pace, neither did all have more than one idea. In several activities (per component) involving traditional mediums, learners used pencils, water colour or poster colours to complete their preliminary sketches. Due to the lack of computers, not all learners could access the computers. The activities involving technology were watered down by allowing a learner to watch a tutorial on the teacher's phones and take away some ideas. Browsing the internet to download various leaves, fruits or vegetables and draw them from the teacher's phones in their sketchbooks was also allowed. The moment learners searched for some ideas on the internet, they were inspired to create their own ideas.

However, most learners used traditional tools using their hands with tools and materials to execute their work successfully. Using ICT to support their pencil or charcoal drawings or their painted works was only allowed once the teachers demonstrated how to use Coral Drawing tools. The learners used technology to create different colour studies and played around to create interesting textures. With patience, many learners were also given a chance to try using ICT.

As with the TPACK framework, connectivism highlights how contemporary internet technologies, such as web browsers and similar search engines, can contribute to innovative approaches to learning (Siemens 2005). These innovative approaches were also reflected in the drawing book and or visual diaries. Working with suitable web browsers helped the learners in their research, as more information was accessible and less time was spent. However, this was possible only if the learners knew the right sources to access information on the Internet.

Comparing traditional tools and to what extent modern technology is used, it was observed that teaching with traditional tools is still the preferred method; however, it was slow and involved much work. Learners found it challenging to grasp what was being taught using the traditional way compared to the modern use of technology. This is perhaps because learners could relate to an everyday experience through recreation, guidance and creative expression, in other words, problem solving and a collective approach through technology is an everyday trend children experience (Mohd Khairezan 2014). This, in hindsight, makes teaching and learning visual arts much easier. Nevertheless, the teachers assessed the learners' understanding of the activities with control and feedback.

- **Senior high school A: Learner 1**

Figure 5.1 Artwork by learner 1 of senior high school A (L1Sa)

The above art piece is the work by learner 1 of senior high school A (L1Sa). As mentioned before, the learner had to design and produce a bread plate. This specific learner took his inspiration from multiple sources. He first took photographs of different leaves, then selected one that fascinated him the most. By looking (observing) at the photograph, he created his first preliminary sketches (part of the process planning of the work). The learner then incorporated some intricate patterns in his basic design by adding and removing some parts of the leaf to achieve his desired design. After having already prepared the clay slab, the learner transferred his design onto it (by tracing it onto the clay). With his traditional scooping tool, he removed the unwanted parts and created a type of relief-sculptured plate. He allowed the clay to become leather-hard, then added his final detailed decorations on it. The learner (as per the observation) could use technology through tools such as a digital camera and the Internet. A camera was used to capture various leaves and YouTube was used to watch some online tutorials on how to create a clay plate before starting his own design. His process drawings and final work were photographed.

- **Senior high school A: Learner 2**

Figure 5.2 Artwork by learner 2 of senior high school A (L2Sa)

Learner two's (L2Sa) art piece was sourced from a natural object. By using the teacher's cell phone, the learner photographed different leaves. Thereafter, the learner transferred the images on the computer and started with his preliminary sketches and developed his ideas further until its final stage. After the final stage, the learner focused on his clay project, turning his 2D designs into 3D designs. L2Sa started preparing his clay using the traditional dry method of preparing the clay. The learner grounded clay into a powdered form before using a sieve to remove unwanted particles from the clay. He continued by adding water, bit by bit to the powdered clay to form a ball of clay. After getting the balls of clay, the learner started using the wedging technique by removing the unwanted particles from the clay. After this process, the learner used the kneading technique to remove air bubbles from the clay. The next stage was to roll a slab using the sack board with a rolling pin and guide sticks. After rolling the slabs, the learner used a plate to get an imprint of it. The learner allowed the art piece to dry before using the scooping tool to incise and bring out the designs. The learner used a rag or foam to clean the unwanted clay and allowed it to dry finally. As far as using

technology is concerned, L1Sa's example reflects how technology can enhance using traditional material rather than replacing it.

- **Senior high school A: Learner 3**

Figure 5.3 Artwork by learner 3 of senior high school A (L3Sa)

The above art piece is the work of learner 3 in school A (L3Sa). As mentioned before, the task learners were given was to design and produce a belt using a copper plate. Their source of inspiration had to be based on any fruits found on the internet or at home/shop. L3Sa took his source of ideas from nature and by watching tutorials online. The latter was to help him develop his ideas into a final product. The learner also went online to search for different fruits. He started by drawing the objects (shapes) of the chosen images of fruit. After that, he searched for images of an open fruit. Using a black pencil, he started with his preliminary sketches and later shaded them with his coloured pencils, adding some detail. For his final ideas, he combined different shapes to design a unique piece of jewellery. For the final design, L3Sa used traditional jewellers' tools, such as a saw frame, saw blade, hand drill, various drill

bits and needle files. As for materials, he used a copper plate as the primary element to create the jewellery piece, as seen below.

Figure 5.4 Learner 3 of senior high school A (L3Sa) final piece

- **Senior high school A Learner 4**

Figure 5.5 Artwork by learner 4 of senior high school A (L4Sa)

The final art piece from school A is the above work by L4Sa. As a source of inspiration, the learner used different pictures of vegetables, apples, carrots and red peppers. The learner used a digital camera to capture them. He transferred the pictures on the computer and used a pencil to do preliminary sketches and added some detail using tonal value. To create the final belt, the learner used the following jeweller's tools: a saw frame and blade, hand drill and various drill bits, needle files and copper plate as its primary material. L4Sa used a jeweller's saw to cut the designs or patterns on the copper plate.

Table 5.7 Senior high school A: Final notes

Topic	Findings/Comment
Planning and preparation	Learning objectives were identified Lesson was sequenced in an engaging and meaningful manner Learners' understanding was assessed
Time allocation per activity	
Teaching/classroom arrangement	Learners were arranged in groups of four. Each group arranged in a circular formation
Mode/method of teaching	Demonstration, discussion, experiential learning
Technology used in class	Laptop, Projector
Effective application of technology by teachers	The instructor used the tools effectively, enabling easy understanding to learners Demonstrated with tools and guided learners on how to use the tools
Teacher experience/ technology used	Instructor had total control of subject matter
Resources used – e.g., available software application, computer devices, instructional materials, e.g., brush paint and others	Laptop Projector Instructional tools and materials used include pencil, ruler, coloured pencil, tracing paper
Assessment materials	
Learners' participation (in relation to TPACK, which involves learning, attention and problem solving through network participation)	Instructor downloaded a short video from the internet and showed it via a projector Learners participated actively by watching short videos on how to develop ideas from objects shown by the instructor
Feedback from learners during lesson (in relation to TPACK)	Teaching and learning were interactive and effective. Learners experimented after watching video. Instructor used the inquiry-guided approach to achieve this aim.
Compared to using traditional tools, to what extend is modern technology used?	Modern technology combined with traditional tools were used in this lesson Use of technology was highly effective Made teaching and learning easy and fun at the same time
Classroom management	The instructor had total control in the classroom Organised student in groups for easy control
Lesson delivery	Used multimedia and technology Used up to date teaching materials Instructor used the co-operative learning approach
Presentation challenges	Inadequate space was a challenge class was over heated due to number of learners

Table 5.8 Aspects examined in learners' visual diaries/drawing books

Topic	Findings/Comment
Components covered	
Alignment of activities and planning	Learners picked a fruit of choice Developed the fruit into a unique design Final design was used to produce a metal belt
Number of activities per component	Ideation Product definition Prototyping Initial design Testing
Number of activities per component that involve traditional medium	Ideation Prototyping Initial design
Number of activities per component that involve technology	Prototyping Commercialisation
Using traditional tools (pencils, charcoal, paint) – amount	Pencils were used for sketching Coloured pencils were used to colour final design on paper Cardboard was used to model prototype Tracing paper used in tracing final work Pliers used in bending metal sheet Bodkin used in creating holes in metal sheet
Using ICT to support (pencils, charcoal, paint)	Using a laptop and Wacom tablet, learners explored using various brush tools on the computer
Connectivism underscores how internet technologies (web browsers and other search engines) contribute to innovative approaches of learning. Comment how these innovative approaches are reflected in the drawing book/visual diary	Learner-centred approach was encouraged Provided opportunity for learners to make choices about what they are learning Encouraged group collaboration and discussion in the class
Compared to using traditional tools, to what extend is modern technology used? And for what?	The internet played a vital role in the lesson Instructor downloaded videos for learners to watch for clearer understanding Laptop, projector and Wacom tablet was used Instructor used Wacom tablet to draw and project on the board for all learners to see and have a clearer viewpoint
Control and feedback to learners	Learners' understanding was assessed

5.8.3 Senior high school B: Classroom observation

Background

Senior high school B was founded in 1946 by a Presbyterian Church in Ghana located in Aburi. Currently, the school runs a full boarding house facility. The school also falls in Category A of schools typically referred to as the best senior high schools in Ghana. The school was established in 1946 but its origins and evolution can be traced to the work of the Basel Missionaries, who founded the Presbyterian Church of Ghana. The visual arts programmes offered in this school are picture making, textile, graphic design, general knowledge in art, jewellery and ceramics.

During the observation, the subject taught under the visual arts syllabus at senior high school B was graphic design. The two teachers (T1b and T2b) also combined their classes into one large group, using the visual arts studio as their natural settings, making it possible for the participants to feel free to share their ideas, viewpoints and experiences (Cohen, Manion & Morrison 2007). The total number of learners were 38. Due to its large size, the learners were grouped into groups of four. The teacher set up the smaller groups into a large circular arrangement. I examined four learners' workbooks and final projects, i.e., each one from a different group.

Under the topic, Inspired by Nature and Technology the learners were given one activity to work on:

1. Design and produce a book cover titled "insects of Ghana"

The instructional materials were magazines, poster colours, brushes, pencils, rulers or guide sticks, coloured pencils, and tracing paper. Added materials to complete the final product was cardboard, which the teachers provided. The teachers' smartphones, laptops, computers, projectors and software, such as Corel Draw and Photoshop, were made available to the learners. The learners had one week to complete the project, and the time allotted for this task was sixty minutes.

The approach used by the teachers to complete the process was direct (linear) with several steps the learners had to follow during their planning stage. Evaluating the learners' technology tool skills in terms of manipulation abilities was one of the learning objectives of this exercise. The primary objectives of the graphic design syllabus are highlighted in the CRDD (2010:ii):

- Appreciate graphic design as an integral part of constructive living.
- Develop self-esteem, pride, confidence and patriotism by appreciating their artistic creations.
- Develop the capacity for creativity in graphic design using traditional and contemporary tools and materials.
- Develop effective manipulative skills using tools and materials.
- Acquire perceptual and analytical skills through direct artistic experience and processes of self-expression.

- Develop critical thinking and practical skills that assist in harmonising opposing ideas, contradictions and inconsistencies in human life and human relations.
- Be aware of the variety of vocations available in graphic design and opt to choose a viable, fulfilling career.

As with the previous school, I observed the learners' planning and preparation as they worked through the first conceptualisation stages. The development stages included obtaining pictures of insects from the internet as inspiration, then brainstorm some ideas and develop these ideas into possible front cover designs. Again, the teachers first gave a demonstration, followed by a discussion (rough feedback to each learner on how to improve their ideas), followed by the learners refining their final compositions. All four learners who were observed started with their preliminary sketches and showed them to their teachers. After getting constructive feedback, they continued refining their drawings until they were satisfied to use as a final design.

Some learners were given computer-based instruction by the senior high school B teachers on how to improve their initial sketches. All the visual arts teachers from school B had quite a few years of teaching experience. Consequently, T1b and T2b both stated that they could use the software programmes Coral Draw and Adobe Photoshop and urged the learners to use these to improve their drawings. Both teachers made effective use of the technology tools, making it simple for the learners to understand by performing a brief demonstration first and then guiding them as they used the tools. T2b began his lesson by introducing the brief to the learners, then showing them some video tutorials using a computer, the internet and a projector as technology tools to support their demonstration using traditional approaches. As the learners watched the video, they were actively engaged by asking questions about their task.

Again, the lesson was organised in an engaging and meaningful way due to the teachers' use of an inquiry-guided approach. According to the International Technology Education Association (ITEA 2002:6-8), design is "the core problem-solving process of technological development, it is as fundamental to technology, as inquiry is to science and reading is to language arts". In terms of the TPACK framework, both teachers intervened by helping learners understand how technology can be used to improve their ideas. In terms of its pedagogical value, co-operative learning occurred where learners interacted with one another and with their teachers. Also, teachers' understanding of content and pedagogy and how it

connects to technology emphasised the importance of the teacher's role in terms of TK, as reflected by the study by Koehler and Mishra (2013: 101). Again, by combining modern technology with traditional tools was considerably effective in this instance, making teaching and learning easy and fun for the learners, bringing it closer to their world of reference. The teachers, similar to the previous schools, were very involved in the process and employed the following approaches:

- applying multimedia and technology
- using up to date teaching materials and technology
- directing a co-operative learning approach

However, as previously observed, by combing the classes, there was inadequate space for learners to move freely. The classroom was stuffy and hot due to the high number of learners sitting close to each other. In the context of designing a book cover on the insects of Ghana, it was observed that learners followed the same pattern. As inspiration, they searched for various images of insects and different font styles on the internet to create their unique drawings for a book cover. When it came to drawing, some learners printed their pictures and started with their drawing process while others closely observed the insects either online or downloaded them and zoomed in at times to obtain a better view of the finer detail. Similarly, the learners created many sketches, chose the best ones and developed it into a final book cover.

The number of activities per component, such as idea development, preliminary sketches, miniature of work, and final work, was also observed and photographed. The number of activities per component depended on the learners' creative capabilities. Again, due to the lack of computers, not all learners could access computers.

- **Senior high school B: Learner 1**

Figure 5.6 Art by learner 1 of senior high school B (L1Sb)

During learner one's (L1Sb) planning process, preliminary sketches and idea development were well executed based on the learner's observation from the environment and research from the internet using the computer and Wi-Fi, aiding the learner to make good research before starting the planning process. Images used by L1Sb was found on the internet. It was

later downloaded by the learner and printed to serve as a guide, assisting the learner when he used it as a source of inspiration to create the preliminary sketches. The learner also used the Coral Draw designing software to design the final idea before transferring it onto the cardboard. Using this technology in the planning process helped the learner to obtain a final idea of what the book cover will look like in its draft form. It also helped the learner to manage their time and did not waste many materials (traditional) since the learner could manipulate the colours and font.

- **Senior high school B: Learner 2**

Figure 5.7 Art by learner 2 of senior high school B (L2Sb)

The planning process of learner two's work (L2Sb) involves exploring the environment and research done on the internet. Pictures of insects were download from the internet on clip art form. It was printed and used to guide the learner in executing this work. The design was made on paper and later scanned onto the computer to perfect the design to make it look more standard using the Photoshop illustrator. According to the learner, designing a book cover using technology made his work look neater, smoother and added a more professional look. The learner could experiment with different colours, building on her creative skills. It also helped to store the artwork in a soft copy, enabling her to reproduce the same work again and experiment with different fonts and colours.

- **Senior high school B: Learner 3**

Figure 5.8 Art by learner 3 of senior high school B (L3Sb)

Learner three's (L3Sb) work attests to a highly successful design in terms of colour scheme and arrangement of design elements and principles. The derived ideas from the environment and internet helped the learner to make the preliminary sketches and with idea development. The learner's idea was to execute the work simple but attractive. Through the assistance of Corel Soft, L3Sb could smoothen the colours and sharpen the images and fonts used for his book cover design. The learner claimed that working with technology saves time and materials compared with the traditional method of working and it enables every designer to explore since getting access to internet is so easy.

- **Senior high school B: Learner 4**

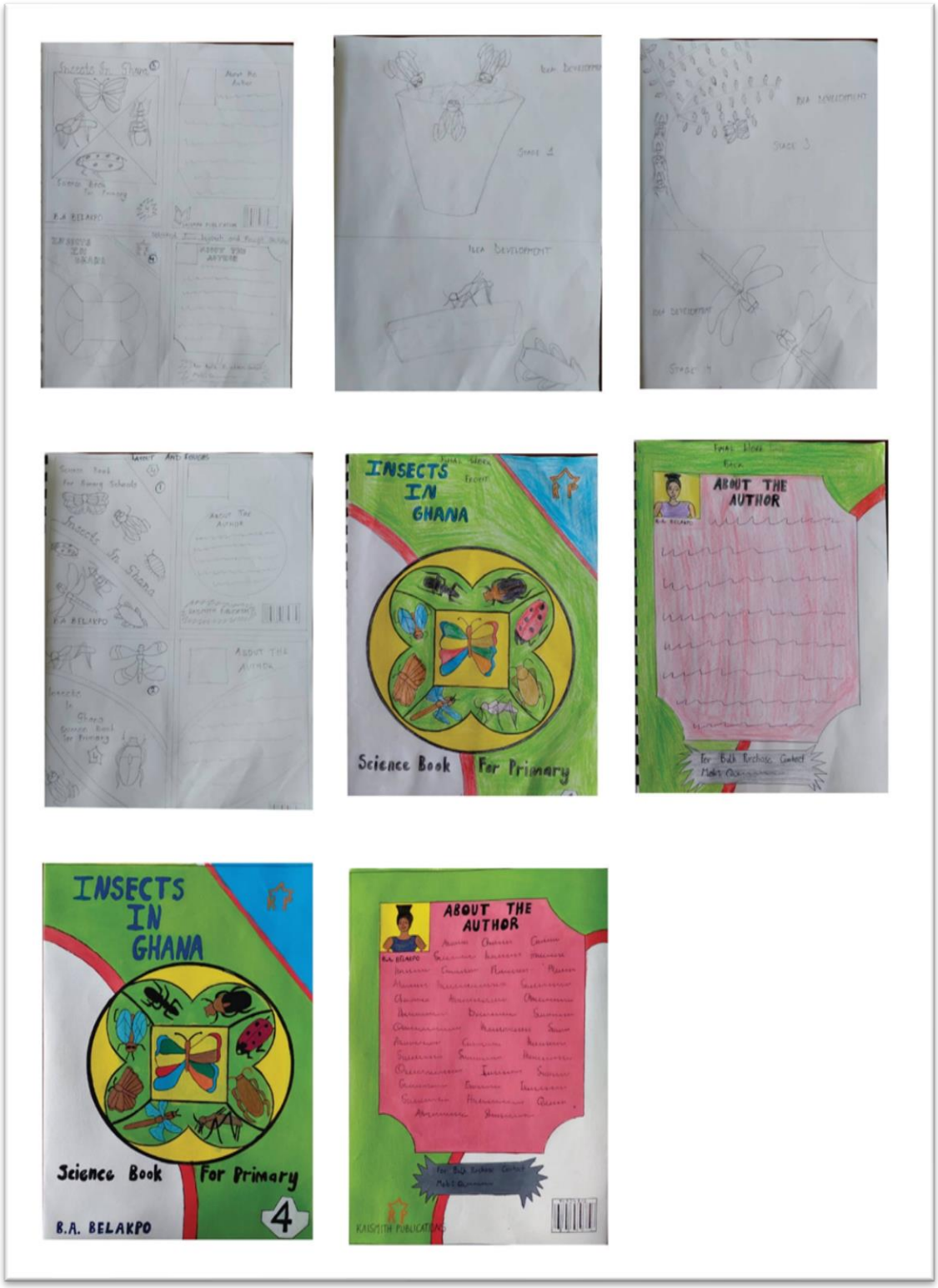

Figure 5.9 Art by learner 4 of senior high school B (L4Sb)

Learner four from school B (L4Sb) used the internet to assist him with developing his preliminary sketches and ideas. L4Sb decided to research various insects using audio visuals (YouTube) and search for videos that would assist him on how to draw insects using basic shapes. This idea boosted the learner's self-confidence in producing the above book cover. Technology played a significant role in developing the learner's designs. The blending techniques available on the software programme assisted the learner to improve his designs. The learner used the illustrator software in making the design before it was drawn onto the cardboard paper. L4Sb claimed (in conversation with his teacher) that technology was fast and helped him to see beforehand what the final work would look like before making it.

5.8.4 Senior high school C: Classroom observation

Background

School C is an all-girls senior high school and was established in 2003. It is in the Akuapem, South Municipality in the Eastern Region of Ghana and began as a vocational school when the government of Ghana took over control of the school in 2009. The visual arts programme offered in this school comprises picture making, textiles, graphic design, general knowledge in art, jewellery and ceramics. The school's mission is to create a conducive environment that guarantees quality, excellence and holistic development of the Ghanaian girl child to unearth her talent and strive to reach her full potential through training, discipline and efficient management of resources to enhance national development.

During the visit at school C, graphic design was the subject taught under the visual arts syllabus. The two teachers (T1c and T2c) also combined their classes for the study and as a normal procedure. Due to the enormous class size comprising 63 learners using the same space, the learners were placed into three groups of ten learners, and the last three groups had eleven learners each. The teachers set up the groups in a horse-shoe formation. Four learners' projects were selected from the class and examined.

Under the topic, inspired by nature and technology, the teacher gave learners one activity to work on:

1. To design and produce a book cover titled insects of Ghana.

With the assistance of the teachers and their laptops connected to the school's Wi-Fi, the learners could source different pictures and ideas of book covers designed by various artists from different countries. Some learners had the opportunity to print out some of the designs off the internet, trace the layout and start modifying it to suit their needs. Other sources available to learners were magazines, poster colours, brushes, pencils, rulers or guide sticks, coloured pencils, and tracing paper. Additional materials for the final design were cardboard paper. Software programmes available were Coral Draw and Photoshop. The observation for this task lasted sixty minutes, and the learners used one week to complete the project work.

The method used by the teachers was linear and had several unofficial steps that the learners had to adhere to when planning. Once the task was handed out, the learners followed the following steps: obtain pictures of insects from the internet as inspiration, brainstorm for more ideas, sketch and develop their drawings as they received feedback from their teachers. Some learners were given computer-based instruction by the school C teachers on how to improve their initial sketches. T1c and T2c both stated that they could use the software programmes Coral Draw and Adobe Photoshop. However, due to the lack of computers and substantial number of learners placed in one classroom, not all learners could get access to a computer. The activities that involved technology included watching a tutorial video and browsing the Internet for ideas. Once the learners received their pictures (printed, from magazines or the Internet), they started with the usual process—drawing and developing ideas, discussing and refining them. Traditional mediums, such as pencils and paints for drawing and painting, were used. Some learners scanned their works or photographed and transferred them to the computers to refine them using Adobe or Coral Draw.

- **Senior high school C: Learner 1**

Figure 5.10 Art by learner 1 of senior high school C (L1Sc)

Learner 1 from senior high school C created her preliminary sketches as part of her process planning. She used traditional tools and media, such as grey pencils, coloured pencils, brushes and poster paints. The learner was given the task to begin and produce a cover entitled insects in Ghana, taking her inspirations from the Internet by looking at the back of magazines online, observing different types of insects and choosing a few for her cover design. She printed some pictures of insects and traced it. Finding different front styles for the title on the Internet guided her to create her own. She used poster paints to finalise the design. Her book title was insects of Ghana, for Primary 4, Science book. She added an author's name and barcode. She then captured the image via a digital camera, which was used for this study.

- **Senior high school C: Learner 2**

Figure 5.11 Art by learner 2 of senior high school C (L2Sc)

Learner 2 from school C (L2Sc) (example above) and L3Sc (learner below) also created their preliminary sketches as part of their process planning. She used traditional tools, such as pencils, rulers, eraser, brushes and other media, such as poster colours. L2Sc and L3Sc were given the task to begin and produce a cover entitled insects in Ghana. They took their inspirations from the Internet by looking at the backs of magazines online, observing several types of insects and choosing them to design their front cover. They printed some of the insects from the internet and drew it on the front and the cover page of their work. The front theme for the title they used was taken from the back cover of magazines found online. Once completed, they used poster colours to paint the front cover of their designs, added the title, insect of Ghana and other details.

- **Senior high school C: Learner 3**

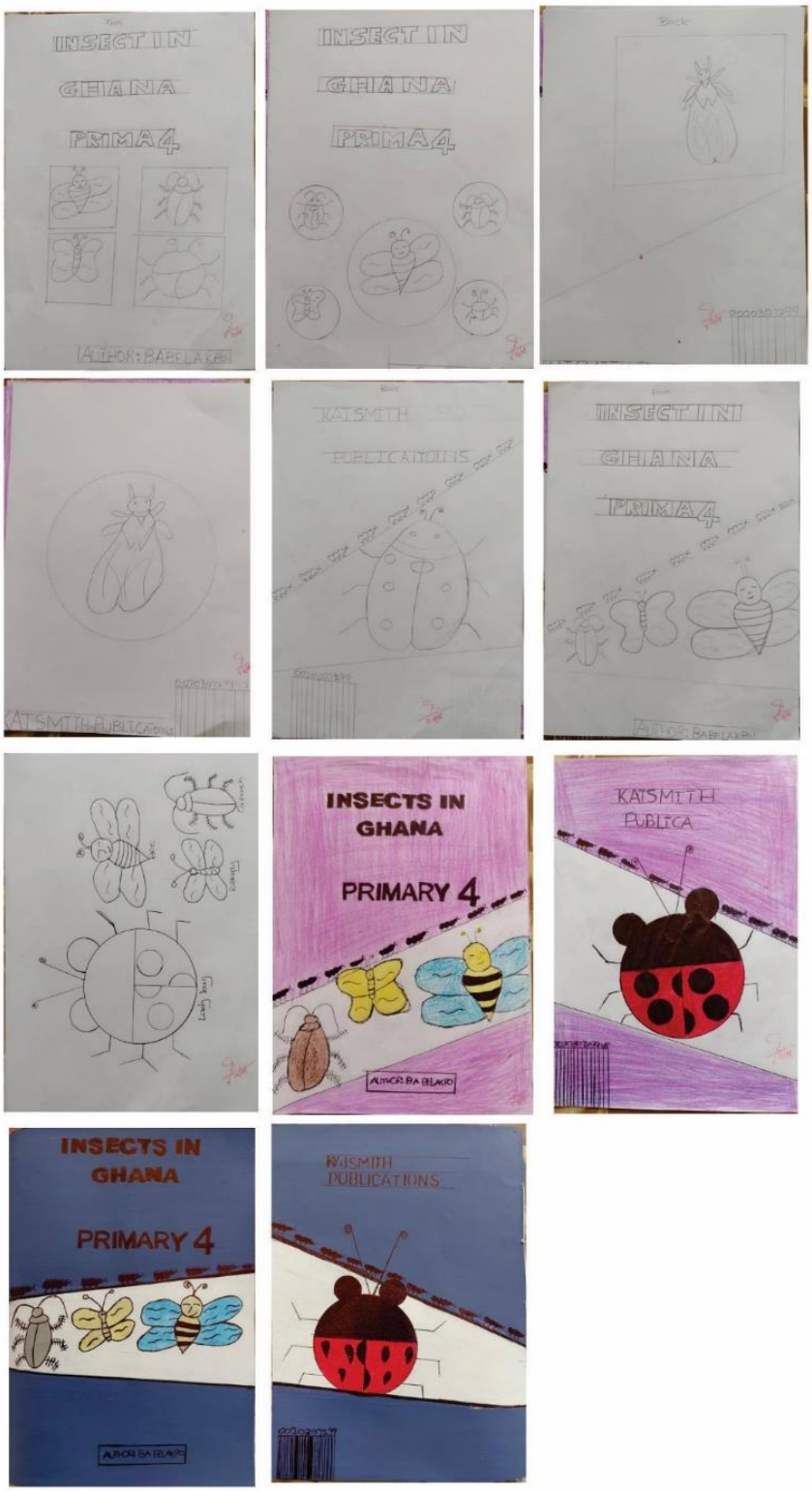

Figure 5.12 Art by learner 3 of senior high school C (L3Sc)

- **Senior high school C: Learner 4**

Figure 5.13 Art by learner 4 of senior high school C (L4Sc)

The artwork above was created by learner 4 from school C (L4Sc). As part of her process planning, she created several preliminary sketches and followed the same linear process as her peers (see previous).

5.8.5 Senior high school D: Classroom observation

Background

School D was established in 2003 and falls within the Category C Schools. School D is one of the senior high schools in the Eastern Region at Aburi of the Akwapim South District. The school was initially recognised in 1991 as an upgraded institution of the Aburi Experimental Junior Secondary School. It was only in 2015 that the school offered programmes such a visual arts. The current subjects offered by the school are picture making, textiles, graphic design, general knowledge in art, jewellery, ceramics, leatherwork, and sculpture.

In School D, the picture making and ceramics subjects were the courses under the visual arts syllabus that teachers taught in two classrooms during my visit to the school. Both teachers, T1d and T2d, had their practical lessons in their art studios. I observed both at various times

on their timetables. The class sizes in total comprise 36 learners. The learners were split into four groups. The teacher set up the groups in a circular formation. Four learners' project were selected from the class and examined.

Under the topic, inspired by nature and technology, the teachers gave learners one each a picture making class and ceramics class to work on:

1. Design and produce a pictorial composition titled Mango harvest
2. Design and produce a bread plate

Again, using the teachers' laptops connected to the school's Wi-Fi, learners could observe different types of artwork on the theme. The instructional materials available for traditional materials were posters, water colours, brushes, pencils, rulers, coloured pencils, and tracing paper. Additional materials for the final product were cardboard and software, such as Coral Draw and Photoshop and were made available for learners to use. My observation of the learners in the classroom for this task lasted sixty minutes, and the learners used one week to complete the project work.

The brief was handed out, followed by a quick computer-based instruction by the School C teachers to the learners. Some programmes used were Coral Draw and Adobe Photoshop. The teachers advised the learners use these for better quality drawings and final additions. T1c and T2c stated that they could use the software programmes well, which was evident since they could use these through the demonstration they gave the learners. Both teachers made effective use of the technology tools, making it simple for the learners to understand by performing a brief demonstration first and then guiding them as they used the tools. T2c began the lesson by showing a short video tutorial found on YouTube on how to design a book cover. As part of the lesson, the teachers also did a short demonstration using a projector. The lesson was organised in an engaging and meaningful manner, giving learners an opportunity to raise questions and interact with their peers and teachers; hence, the teachers followed an inquiry-guided approach. In terms of the TPACK framework and its pedagogical value, problem solving using technology was the primary focus. This approach emphasised the importance of the teachers' understanding of content and pedagogy, and how they connect and interact with their learners. It brought together the teachers' knowledge of technology, pedagogy, and content for a comprehensive understanding. The TPACK framework was applied and linked the content of the Visual Arts subject, the pedagogy of teaching and learning, and the use of

technology. This helped the learners better understand how to plan and organise the integration of technology in their Visual Arts learning process, and cater to their needs.

Table 5.9 Observations during classroom lessons

Topic	Findings/Comment
Planning and preparation	The learners were given questions to choose from For them to produce good work, they produced preliminary sketches to aid them
Teaching/classroom arrangement	The classroom was arranged so that the teacher could go around and inspect and guide learners as they work
Mode/method of teaching	Demonstration was used to teach learners using the projector, showing learners what to do based on the questions given to them
Technology used in class	A projector, laptop and Wi-Fi were used. The Wi-Fi help the teacher to research from the internet and project to the learners in visuals using a laptop and projector
Effective application of technology by teachers	The teacher used computer devices throughout the lessons since it made it easier and faster for the learners to understand
Teacher experience and technology used	The teacher experienced that teaching art with modern technology makes teaching easier, as learners can understand what art entails and how technology enlightens them
Resources used, e.g., available software applications, computer devices and instructional materials, e.g., brushes, paints and others	They used computer devices to help them explore ideas and paints and brushes to help them execute the work
Assessment materials	Learners were assessed with a computer device, art materials and tools to produce a work based on the questions given to them
Learners' participation (in relation to TPACK, which involves learning, attention and problem solving through network participation)	Learners could operate computer devices to help have an idea of it and teach them to work on their own in the teacher's absence or in the future
Feedback from learners during lesson (in relation to TPACK)	Learners with joy expressed themselves a lot They claimed that using technology to teach them makes learning easy and fast Their confidence to work any place in the world was boosted because technology is taking over the world
Lesson delivery	It was a success; whatever needed to be achieved was achieved
Presentation challenges	The network was the primary challenge; it was bad from the onset but became stable as the classes progressed

Table 5.10 Aspects examined in learners' visual diaries/drawing books

Topic	Findings/Comment
Components covered	Research, drawings and production
Alignment of activities and planning	Researching first, later sketches were made, and the actual art was produced
Number of activities per component	
Number of activities per component that involve traditional mediums	Sketches or preliminary sketches involved using traditional mediums to help build their skills in the absence of computers or blackouts
Number of activities per component that involve technology	Researching and planning layouts of the work was made using the computer
Using traditional tools (pencils, charcoal, paint) – amount	It was used in executing the works
Using ICT to support (pencils, charcoal, paint)	ICT helps a lot Learners' works can be scanned and duplicated in numbers and edited if the right software is attached
Connectivism underscores how internet technologies (web browsers and other search engines) contribute to innovative approaches of learning. Comment on these innovative approaches as reflected in the drawing book/visual diary	Working with the correct web browsers help research to be easier and less time is spent if you know the correct source to gain information on the internet. The moment leaners have an idea through research made with technology, creating things using their hands with tools and materials becomes a success
Compared to using traditional tools, to what extend is modern technology used? And for what?	Teaching with traditional tools helps but is slow, involves a lot of work and learners find it challenging to grasp what is being taught compared to modern technology that makes teaching and learning easy

- **Senior high school D Learner 1**

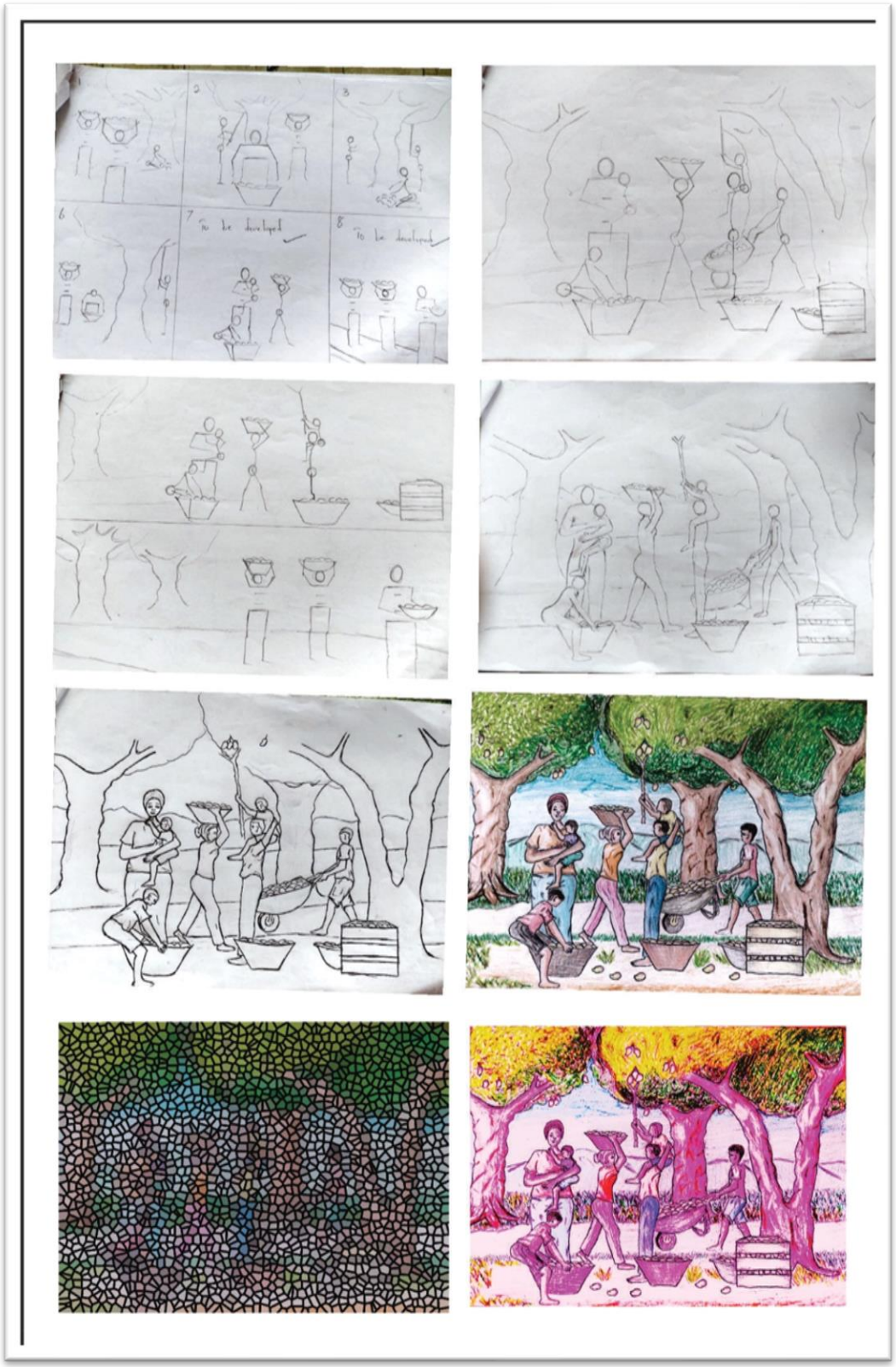

Figure 5.14 Artwork by learner 1 of senior high school D (L1Sd)

The above artworks were photographs taken from learner 1 of school D (L1Sd). The learners were tasked to design and produce a painting on the theme mango harvest. L1Sd created preliminary sketches as part of his process planning. One can see how the learner used traditional tools (grey pencil and colouring pencils). The learner took his inspiration from the Internet by browsing on his teacher's phone and selected some photos that gave him more ideas to start his work. Then the learner used poster colours to paint the first miniature. The learner scanned the picture and worked further on it on his computer using Coral Draw. By doing so, the learner could improve on the colour scheme of the work using the effects tools and chose creative. Under innovative tools, he selected mosaic for the work to have a mosaic effect. Finally, he used the image adjustment lab to transform the picture into a different colour scheme.

- **Senior high school D: Learner 2**

Figure 5.15 Artwork by learner 2 of senior high school D (L2Sd)

Learner 2 of school D (L2Sd) (above) and learner 3 (L3Sd) (below) of the same school created a design with the theme mango harvest and painted it. The media used for this was traditional, and for technology, they used their teachers' phones to browse the Internet searching for various pictures to choose any that provided them additional inspiration to begin the task. The first miniature was painted by the learners using poster colours, and after scanning them, they continued working on it in Coral Draw on the computers. By doing this, the learners could enhance their works' colour schemes. Both used the creative tool effectively and, by selecting the Image Adjustment Lab, they could manipulate the image using different textures and doing different colour studies by selecting different colour schemes.

- **Senior high school D: Learner 3**

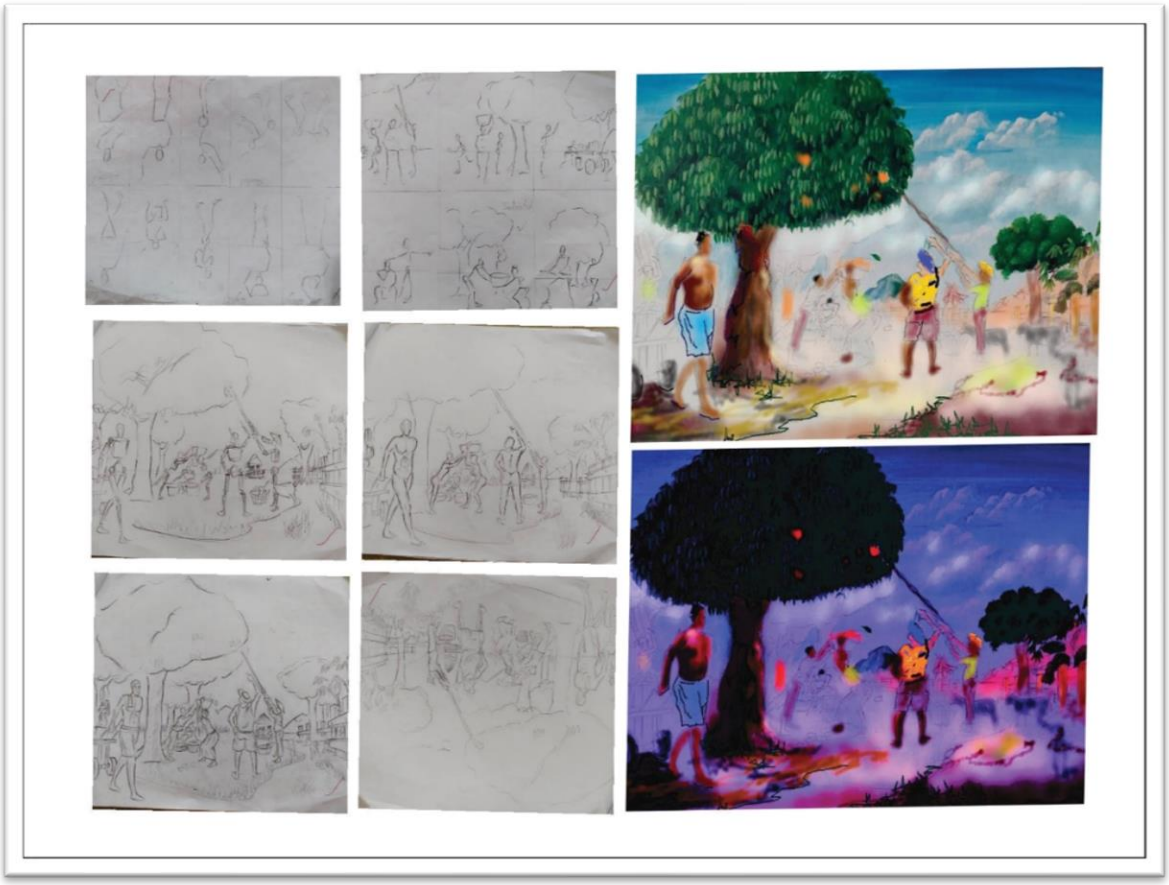

Figure 5.16 Artwork by learner 3 of senior high school D (L3Sd)

- **Senior high school D: Learner 4**

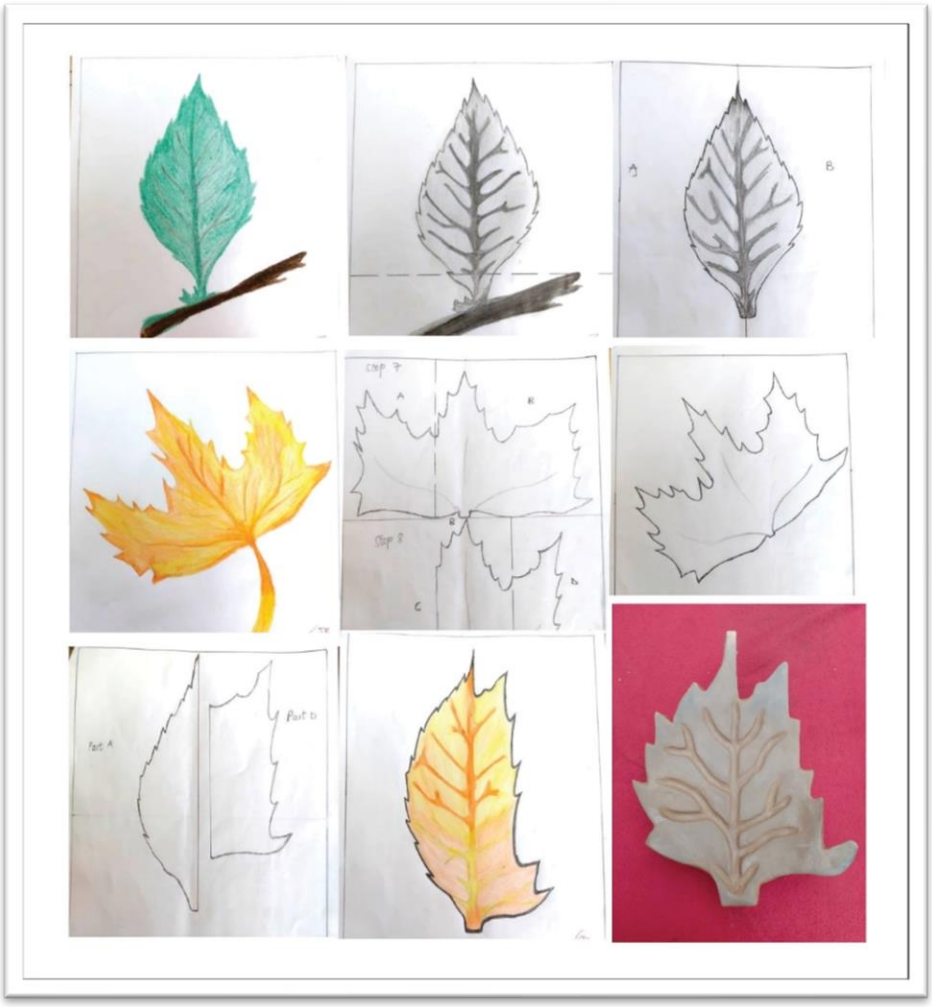

Figure 5.17 Artwork by learner 4 of senior high school D (L4Sd)

The artwork displayed above was created by learner 4 from school D (L4Sd). The task for the learners was to design and make a plate to hold bread. The learner used various leaves as his inspiration. The learner went outside and took pictures of many leaves before choosing one that really attracted him. After choosing the best shot, the learner started drawing it from observation (looking at the screen). L4Sd introduced unique and complex basic designs by combining various leaves and creating his original design. Following the traditional preparation methods of working with clay, he applied his pattern to it and refined it until he had his desired plate.

5.9 Conclusion

In conclusion, the classroom observations and examination of the visual art learners' source books confirm that the learners demonstrated high-quality work by combining technology tools with the traditional methods of designing their artworks. It was also noted that in their teaching approaches, the teachers were confident towards using technology when integrated with traditional media. Furthermore, this study's findings show that teachers use the full potential of ICT (when and if available) in their instruction processes.

CHAPTER 6

DISCUSSION OF THE FINDINGS

6.1 Introduction

This study's primary purpose was analysing how technology interacts with established pedagogical approaches and the degree of influence it exerts on developing learners as future creative thinkers and productive citizens. Therefore, the research has brought to the fore how teachers employ ICT tools in the visual arts classroom and assessed the interactive communication between teacher–sender and learner–receiver within the context of TPACK.

This section summarises the insights gained on how technology cooperates with the instituted pedagogical approaches and its impact on developing learners' skills and capacity to function professionally in the 21st-century marketing requirements. Considering the knowledge gap the study desires to fill, the insights and findings obtained during the research are considered contributions to the relevant scholarship.

The leading question in this section is: Do learners develop independency and competency with adequate information on technology applications in the context of global market requirements?

The themes outlined in the text derived from the participants' memories of similar personal experiences and are interpretative narratives of the respondents related to their views and empirical knowledge about comparable and similar circumstances and happenings.

6.2 Findings of data analysis: Thematic presentation

Having achieved the study's objectives as defined in Chapter 2, the findings will be presented and discussed under the themes indicated below. Each theme is indirectly linked to the literature review and directly to the research objectives. Based on the issues focused on during the study, the findings also reflect the teacher–participant viewpoints on the subject matter.

- Identifying the technological tools used in teaching and learning of visual arts
- Current approaches in teaching and learning visual arts at Ghanaian schools
- Access and usage of ICT tools at senior high schools
- Availability and challenges of ICT tools to the overall application in visual arts

pedagogical approaches

- Pedagogical value of ICT integration with visual arts education-instituted approaches
- Visual arts skill technique development through the integration of traditional and innovative pedagogical approaches

6.2.1 Theme 1: Identification of the technological tools used in teaching and learning of visual arts

In the framework of pedagogical approaches, findings revealed the level of participants' understanding of technology and its incorporation in visual arts education. The respondents indicated that technology is applying scientific knowledge practically to reach their teaching targets by making the creative process easier. To this end, they stated that they apply frequently technology in teaching and learning in their visual arts classes. Another group of respondents considers technology and using ICT tools in daily activities. They revealed that laptops, projectors and smart phones are the ICT tools they use most to bridge the distance between visual arts theory and practice. In this context, they emphasised they use their smart phones. It is established that respondents (teachers) have high confidence in using technology to teach visual arts, as most learners in the visual arts class are passionate with this form of practicing art, making teaching and learning more interesting and interactive. Confidence levels in teaching visual arts, therefore, are subject to the respondents' degree of control on the subject area.

The study also revealed the environmental factors influencing the quality of teaching and learning visual arts at schools. The respondents indicated that well-resourced studios and workshops contribute to well-prepared learners, as conducive learning environments exercise a significant degree of influence on the quality of teaching and learning visual arts. In the context of the Fourth Industrial Revolution and postcolonial era, this finding is crucial and deserves special attention to steer motivation for building a better future for today's learners. Findings brought to light that the visual arts process, comprising drawing, creative thinking and problem solving through rational planning, is resourceful and fundamentally helpful; hence, the need to use technology in teaching and learning. Some respondents have stated that they allow learners to use technology in their compositional drawings or during the planning stage of their final artworks. The above responses have confirmed that teachers draw their confidence from the proficiency in the instruction content or the subject matter in terms of technology aptitudes, especially when supported by positive results of their learners. This

result is in line with TPCK concepts that must be taught in coordination with technology specifics. This combined application is most significant because it promotes the usefulness of technology in the hands of the human brain; in this case, by assisting teachers in their instruction processes. This case demonstrates how technology used as a supporting tool can enhance the CK of the learners' level of understanding.

6.2.2 Theme 2: Current approaches in teaching and learning visual arts at Ghanaian schools

As for traditional tools being used either on their own or integrated with technology in teaching or learning visual arts, respondents asserted that most teachers typically approach their ICT learning based on each teacher's individual capabilities. ICT literate teachers relate well and wish to further develop technology literacy by minimising or refuting the associated illiteracy embarrassment or shyness. This presupposes that the inborn human creativity and existence of qualified proficiency in instruction could inspire and maintain a teacher's motivation to follow the road forward through empirical knowledge and adaptation to innovative approaches. The respondents emphasised the availability of appropriate tools and materials at visual arts senior high schools as an essential factor significantly affecting both parties, teachers and learners, in terms of motivation and performance.

Under this theme, the study brought to light that using suitable tools and materials in designing are essential indispensable means in teaching and learning visual arts. Consequently, in the context of the nowadays socio-economic needs and professional capacities, it is essential that the government and other stakeholders make these tools and materials available to visual arts teachers to enhance their practical skills through proper training. This is especially significant in the context of the 21st-century socio-economic environment, which exercises pressure onto teachers and learners to develop technological aptitudes based on the comfortable use of suitable tools.

6.2.3 Theme 3: Access and usage of ICT tools for senior high schools

The NAEA holds firmly that using technology and technology-related tools in the visual arts classroom is crucial (NAEA 2015:2). The association supports blending technology in visual arts education as a 21st-century skill, with the opinion that visual arts give learners the privilege to develop and build their skills and capacities in many areas by developing information, media, and ICT literacies (NAEA 2016a, cited in Strycker 2020:2). Visual arts

education programmes can be re-modelled to incorporate technology, such as developing and presenting a digital portfolio instead of the traditional visual arts diary. I believe that assessing such a portfolio is easier for the teacher and the moderator to evaluate the learners' artworks. Through their relevant research on digital, Baer and Danker (2017:1, 2) encourage art learners and teachers to improve "the field of art education" by understanding and using technology to create their digital portfolios through a digitally guided process. They argue that learners and teachers are constantly involved with tactics and strategies on teaching arts and the definition of their role and capacity to teach this subject. This overwhelming process of training the new generation of teachers can be easier applied "through a curricular structure", starting with a self-presentation through "an examination of their own context and understanding". This process will encourage them to organise "thoughtful, digitally relevant research centered on improving the field of art education"

According to the study, for their preparation lesson and personal development, respondents use mobile devices, the Internet, Intranet (school network), projectors, software (Photoshop, CorelDraw, Sketchpad), video websites (YouTube, Netflix, Vimeo) and learning management systems (Google Classroom, Moodle, Blackboard) for teaching. ICT types, such as personal computers, digital cameras, CD/DVDs, printers, scanners, television, smartboard and whiteboard apps (Jamboard, Educreations), among others, are not used for teaching. This result might be partly due to the unavailability and irrelevance of such tools in the world of visual arts or their archaic nature. Studies reveal that teachers find it particularly challenging, if not impossible, to integrate technology in their approaches since the technologies they need are either not available or not easily accessible to them or their learners (Ely 1999).

Literature has been documenting concerns about visual arts teachers' willingness to integrate ICT in their teaching (Duncan 1997; Matthew, Callaway, Letendre, Kimbell-Lopez & Stephens 2002 Kwakye & Ghartey 2019). For instance, teachers' traditional ideologies concerning aesthetics and their beliefs about the incompatibility between educational technology and art itself have been identified as barriers to adopting ICT (Matthew et al. 2002; Wood 2004). Misconceptions towards ICT integration among visual arts teachers was reflected by a strong negative attitude that stirred an extensive concern among researchers (Roland 2010; Mohd Khairizan 2014; Konak 2018; Kwakye & Ghartey 2019). Research by Coleman and Cramer (2015), Wang (2002) and Bamford (2001) have shown continued reluctance by many visual arts teachers to embrace new technology into their subject due to

the concern that it will decrease learners' creativity, artistic expression and understanding of art forms. Researchers have shown that ICT integration into the visual arts subject was far from accomplishing its target (Mohd Khairezan & Au 2017).

6.2.4 Theme 4: Availability and challenges of ICT tools to overall application in visual arts pedagogical approaches

To assess the impact the joined use of technology and traditional tools in the teaching and learning process, according to the study, the following factors have come to the fore: the non-availability of TLs, lack of space, equipment and resources, and a lack of audio-visual arts teaching and learning aids, presenting severe challenges in applying pedagogical approaches. Precisely, the lack of tools, materials and proper refurbished studios for practical applications are creating negative circumstances for any related application.

Factors influencing the quality of teaching and learning visual arts in schools were ascertained. It has been realised that a lack of resources, limited classroom space, limited ICT tools and materials are factors influencing the degree of quality of teaching and learning visual arts in schools. The study drew attention to negative factors serving as challenges in the teachers' pedagogical approach, sometimes difficult, if not impossible to overcome. Among the challenges faced by visual arts teachers in teaching and learning processes, the study further brought under attention the negative consequences of the lack of practical experience and inadequate materials for efficient work performance. According to the findings, learners tend to play too much in class while less drawing work is made manually.

Furthermore, respondents explained that the challenges of applying pedagogical approaches are a lack of textbooks and, when requisitions are made, the administration refuses to honour them. This result affirms a relevant study indicating that teachers find it particularly challenging, if not impossible, to integrate technology in their approaches because the technologies they need are either not available or not easily accessible to them or their learners (Ely 1999). Mumtaz (2000) and Kwakye and Ghartey (2019) stress that teachers struggle to accept organisational change to outside intervention due to time management problems and a lack of support from the administration.

On the same theme, respondents emphasised that teachers in other areas of learning pass derogatory comments to demean the subject when it is their turn to teach, adversely affecting a learner's motivation. The respondents emphasised the lack of practical experience and

inadequate materials for efficient work performance. Most indicated that quite often, due to a lack of materials for teaching, teachers rely on pictures and videos to show learners how such items are done. Respondents again stressed that a lack of materials in the teaching and learning of visual arts is a demotivating factor.

Wang (2002) reported continued reluctance on the part of visual arts teachers to embrace new technologies and referred to a study of accomplished art teachers and quality art education (Bamford 2001) within which no mention was made of including ICT. While some resistance to integration might be attributable to age, research by Wang (2002) cited in Delacruz (2004) suggested that, although many art teachers are using more ICT tools, most use only basic applications, rather than applications intended to enhance creativity. Wood's (2004) work highlights that while some teachers believe technology maintains learner engagement and provides inspiration, others were concerned that learners could be easily distracted.

Resource restraints, lack of support and lack of time have been documented as barriers on visual arts teachers' willingness to integrate ICT in the visual arts classroom (Henning 2000; Wang 2002; Delacruz 2004). Furthermore, professional development that does not focus on a specific content area has been found to be less effective (Wood 2004).

6.2.5 Theme 5: Pedagogical value of ICT integration with visual arts education-instituted approaches

To establish the educational role of technology in class, I have concentrated on the importance of integrated pedagogical approaches and their interactive impact on the learning and teaching outcomes. The study, thus, brought to light that the integration of ICT in visual arts education makes teaching easier and more understanding. Furthermore, it underlined that using ICT tools plays a constructive role in visual arts teaching and learning by facilitating the artwork production in terms of time, accuracy and interest. Again, under this theme, the study demonstrated that integrating ICT in visual arts helps learners to access more information and ideas for their work, enhancing the drawing process through better and broader knowledge about the subject matter. According to the respondents, the integration of ICT in visual arts helps learners to access more information and ideas about their subject matter and enhances collaboration among learners and teachers because it allows both parties to access, discuss and develop their personal views and ideas according to the information available to them.

Findings have further demonstrated that learners are excited when they see IT-related tools in the classroom. Consequently, the respondents daily use ICT through available computers to enhance teaching and learning processes and performance targets. According to them, it is not challenging to integrate ICT into visual arts teaching because of the well preserved Ghanian cultural traditions and the existing youth's familiarity with sophisticated phones. Therefore, trusting the human aspect of their traditional values to control their youth's ability to wisely choose their options, they would allow learners to access information on the Internet. As teachers want their learners to know that all relevant information they need can be found on the Internet, they, as qualified pedagogists, should provide their learners with enough stamina to maintain the balance between the personal, human capacity and the impersonal technically provided service.

The above statement is confirmed by the following finding where respondent teachers instructed their learners to go through the development process of an idea by picking objects from their environment and on the Internet and building upon it. This technique helps them to develop a unique work structure. Through this process, learners can use ICT in their planning and drawings of their final artworks. Furthermore, to access information in class, learners often ask to use teachers' mobile phones for various search engines, such as Google. This approach helps teachers to strengthen the communication between them and the learners. The respondents use ICT for quality instruction purposes, but they also refer to their need for more ICT devices, such as laptops, to enhance teaching and learning processes, expressing teachers' personal involvement and interest to equip their learners with appropriate resources for real-life needs through additional research work outside the class.

These findings positively relate to a study conducted by Oliver (2000). He asserted that the visual arts education system improves the quality of learning for learners' benefit and fosters responsibility, maturity, gain in knowledge and mental growth, which offers amusement to the teacher and the learner. Akudolu (2007) asserted that combining education and entertainment to pursue academic achievement becomes easier for teachers as they impart knowledge through a more enjoyable learning process. A wider knowledge spectrum can generate more ideas—crucial for developing creative and critical thinking. If the incorporation of ICT in visual arts education in Ghana is realised properly and well-controlled by the responsible decision-making authorities, the outcomes of such an endeavour can confirm that relying more on the Internet can broaden learners' ideas and strengthen their

creative motivation by direct and global exposure to more and different art works while assisting them to compete.

Educational technology has offered many possibilities for transformation and therefore enrich the visual arts education focus area. Adapting ICT tools in visual arts instruction can change pedagogical approaches radically and improve individual learning outcomes by transforming the classroom social practices (Forgasz & Prince 2004; Goos 2005; Kwakye & Ghartey 2019). Therefore, due to this positive impact on teaching and learning visual arts (Becta 2003; Ittigson & Zewe 2003), it is essential for teachers in senior high schools to integrate technology in their teaching to enable learners to better understand the visual arts pedagogical system in terms of instruction, literature, methodology and learning outcomes. Apart from promoting a learner-centred pedagogical approach where the learners construct their knowledge, meaning and solution to problems and briefs (Hopper 2016), technology integration into art classrooms can boost learners' creativity and critical thinking skills by enhancing and facilitating how they communicate their artistic ideas (Chou, Chang & Chen 2017).

Furthermore, incorporating ICT in visual arts education helps learners develop specific skills, such as their comparative viewing through communication, their self-consciousness, and tolerance about them and others through interaction and group spirit through collaboration. Therefore, based on this study's findings, ICT in general, and especially when introduced at an early childhood education, can sharpen critical thinking skills (Rapitsenyane et al. 2022) because it integrates the acquired knowledge with practical experience in line with those required by the market (Thomas, et al. 1995). Various software programmes are being used for teaching visual arts, enabling the achievement of different teaching and learning goals. Using computers is not limited to using software but extends to using the Internet for further information materials. Furthermore, in the classroom, instructors can use drone footage, mobile apps, and programmes, such as Google Earth, to bring outdoor environments inside, thus bringing far away or inaccessible outdoor phenomena to all learners or learners (Claiborne, Morrell, Bandy, Bruff, Smith, & Fedesco 2020).

According to Galvez (2018), numerous studies have noted that art education deserves a special place in national education curricula because of repeated statements regarding its benefits, primarily in logical and critical thinking development. Galvez states that art education is one of the crucial components with higher expectations for academic teaching.

Besides, Melnick (2011) revealed many cognitive advantages from art education such as higher academic achievement, creativity, imagination and self-expression rouses the mind of learners and stimulates the brain.

The study consequently revealed that technology makes visual arts teaching and learning easy, as learners learn through a more tangible approach. In line with this finding, the respondents stressed on how technology can assist the user-teacher to work faster, as ICT also allows for modification in completing an artwork. For instance, one can work faster and on a broader platform using webcam since it allows users to upload their artworks onto the Internet. People globally can view, 'like' or 'dislike' or add value through their comments, through social media and other related platforms. According to Wilks et al (2010:56), the benefits of the web are that it gives immediate access to databases about artists, including their complete collections of works, critical evaluations, and relevant background information. The world's top museums can be virtually brought into the classroom through embedding technology. This departs from the traditional way where you need a gallery to display your artworks. T1d further emphasised that ICT enhances collaboration among learners and teachers. Most popular social media applications such as Instagram, Facebook and TikTok, and less popular such as Amazon Han, Artfinder, Art Station and Artplode have allowed artists as creatives to share their work virtually and instantly. These applications allow for other social media users on the app to communicate on a broader platform by partaking, commenting and even downloading and saving the published post. By allowing a wider public exposure through open-ended viewing artworks, directly engaging with and reporting on them, these applications create a far greater spectrum than what a traditional art gallery could have offered.

6.2.6 Theme 6: Visual arts skill technique development through integrating traditional and innovative pedagogical approaches

According to this study's outcomes, traditional approaches in pedagogy place the learner in a submissive role rather than an active learning position, requiring firm compliance to the teacher's directions. In these approaches, one lesson or assignment is given to all learners and the teacher expects the same outcomes from everyone; however, in different wordings. This approach refutes differential learning styles, individuality and the theory of multiple intelligences.

On this theme, the gradual merge of the traditional with the inventive, in this case with technological tools in a controlled, gradual way, can dramatically alter the teaching and learning discourse. The traditional way of teaching and learning is perfect for developing basic skills and techniques, as there is a direct, physical coordination between the inspiration, the executor and the creation. On the one hand, applying these basic skills offers learners the chance of enhancing their observational drawing skills and their thinking abilities to view the world through artistic eyes to gain the opportunity of becoming accomplished artists. However, the current technology arts comprising 3D printers, laser cutters, friendly software design and desktop machines can equip learners with the knowledge on how to use, change and improve modern technologies.

Many respondents emphasised that the traditional way of teaching and learning visual arts fosters and enhances creativity rather than suppresses it. Simultaneously, they accept that educational technology could facilitate the current visual arts skill technique development, as it would make learners more proactive and innovative. Advocating the co-existence between innovative technologies and traditional art processes, Wang (2002) and Wood (2004) extend the possibilities of art expression, communication and perception in combining existing traditional ways with innovative approaches. With an ever-increasing emphasis on still and animated imagery, symbols and iconography in society, the analysis, interpretation, extrapolation and evaluation of visual arts representation have become just as important as artistic creations. Learners must be wise consumers and familiar with how the mass media operates; therefore, visual arts education has a crucial role to play in preparing learners as visually literate and critical thinking members of society (Schwartz 1991; Brown 2002).

The traditional way of teaching using notes, slides and books resists to be replaced by tools drawn from the virtual learning environment—web-based learning environment. This type of learning is defined as the technology that uses the internet as a tool to support and promote learning. However, today it is used as the only tool in distance teaching or as supplementary means to traditional teaching (Basioudis & De Lange 2009).

Based on the data responses and my substantiated interpretations, I believe, I can establish that the effectiveness and impact of ICT in visual arts education cannot be underestimated. The results from the interviewees can successfully be linked to Hopper (2016), who posited that ICT has undeniably provided opportunities for transforming and enriching the visual arts education subject area. Apart from promoting a learner-centred learning approach, where the

learners construct their knowledge, meaning and solutions, ICT integration into visual arts classrooms will increase learners' creativity and critical thinking skills in expressing their artistic ideas (Chou, Chang & Chen 2017). Furthermore, ICT will promote a real problem undertaking and collaborative approach. It offers a real-world experience through simulation, management and creative expression that have never been highlighted before in conventional art classrooms (Mohd Khairezan 2014).

Becker (2000) cited the need for computers to be seen as problem-solving machines to solve regular curricula and typical school problems, especially issues concerning learning, instructing or school administration. According to Lankshear, Snyder, and Green (2000), the effectiveness of learning can be increased and its outcomes improved through the use of appropriate educational technology selected by a teacher. Similarly, Smith, Hardman, and Higgins (2006:32-33, 443-457) hold the view that ICT plays a crucial role in enhancing the quality of teaching and learning. ICT presents unique opportunities for supporting creativity (Brown 2002) and extending visual arts "beyond clay, crayons and paint" (Stankiewicz 2004:88). This potential was recognised as far back as the 1980s when Crowe (1988) commented that ICT could assist with exploring design problems, enhance artistic decision making and provide new opportunities for learning. Since then, the literature has continued to highlight the potential for ICT in supporting visual arts teaching: "For visual arts education, these are incredibly exciting times, offering new possibilities" (Long 2001:262). As an example, the teaching and learning of fine arts in Nigerian institutions, most importantly in the 21st-century, have developed within the framework of theory and practice. In this technological age, the effective means of communication in the classroom instruction requires using communication technologies.

On the level of challenges surrounding the integration of traditional approaches and innovative technology-oriented methods, it has been found that integrating ICT into teaching visual arts is not challenging because there are simplified tools and resources that can render the learning process into a pleasant and interesting journey. This study revealed that ICT stimulates collaboration among learners and teachers. According to the substantiated evidence, teamwork is due to the advancement of technology where those learners already familiar with ICT evidently connect to the teacher fostering cordial teaching and learning interactive relationships when they meet a teacher who uses technology in teaching. Collaboration is another 21st-century skill where group effort opposed to individual work is

on the increase. The need to work and think together in society shifts the focus from individual independence to community inclusion. Though aimed at global acceptance, this 21st-century humane approach can be linked with the South African traditional Ubuntu philosophy. Baer and Danker (2017:8) give a characteristic example of an ideal elementary art classroom where learner and teachers co-created a product by collaborating in their groups on a shared vision. In this process, these groups inevitably had to share critical assessing thoughts and partake in discussing media and or structural issues, rethinking, testing, acting, revising and reconsidering outcomes.

In conclusion, in both branches (traditional and technology-based pedagogical approaches in visual arts), it is imperative that skills should be taught concurrently and acquired by the learners to be used in their future daily lives. The current visual arts curriculum does not provide for an integration of traditional and technology approaches in the classroom. This study revealed that technology is not going to cease its advancement anytime but continue to consistently develop even at a faster rate. Therefore, visual arts education-based a) on traditional principals, shared by any member of a society, and b) on available technological tools can be proven highly creative, most productive and pedagogically essential. c) Visual arts teachers must improve their technological practical skills through proper training, especially in the context of the 21st-century's demands. d) The interaction between one's inner, creative thinking and their external, the tangible, creation of a work can be significantly facilitated and, accordingly, enhanced through technology training, especially in visual arts education. e) Integrating traditional teaching approaches should be respected and integrated with the advantages technology offers.

CHAPTER 7

CONCLUSION, CONTRIBUTIONS AND RECOMMENDATIONS

This study has meticulously analysed purposeful and affective pedagogical approaches that visual arts teachers apply to effectively engage learners in the learning process. This research contributed to the body of knowledge by exploring the integration of technology and pedagogical approaches in the visual arts classroom in Ghanaian senior high schools. The study aimed to address the challenges and problems related to the use of technology in the classroom. It proposed adopting and adapting modern technological tools to improve visual arts education. The main research question was "How can integrating of technology and traditional tools improve visual arts teaching and learning at the Ghanaian SHS?". The secondary questions were, “What are the current technological tools being used in VA teaching and learning, and how are they being used in conjunction with traditional methods?”, “What is the pedagogical impact of technology in teaching VA in comparison with approaches based mainly on the use of traditional tools?” and “What are the challenges and problems associated with adapting modern technological tools for VA education, and how can they best be addressed to enhance practical training approaches in schools?” The research objectives were to identify the technological tools used, the extent and way they were used, assess their impact, analyse the related challenges and problems, and propose ways to adopt and adapt modern technological tools.

According to this study’s findings, there are teachers with the appropriate resources and skills to meet the needs of their learners beyond academic instruction. Furthermore, this study’s results have demonstrated that IT in visual arts education is a crucial contributor to learners’ success. Therefore, to build a healthy teacher–learner relationship, teachers should be well equipped with the necessary skills to motivate their learners to successfully use ICT tools in visual arts instruction classes. In this context, it is recommended that most art teachers should be well trained in ICT skills in visual arts to instruct their educational subject matter and extent their art knowledge to learners using modern technologies. Based on the examined results, my study has shown that the interviewed visual arts teachers maintain confident mindsets and positive stances towards ICT incorporation into the visual art classrooms.

This pedagogically substantial result was expressed through the teachers' concerns toward their learners' needs. Using ICT, learners' understanding, motivation and satisfaction toward the delivered instruction were increased. For a successful pedagogical reform and changes, it is crucial for teachers, as vital educational agents, to practice positive attitudes and beliefs. A positive state of mind, attitudes and concepts toward educational change could lead to further constructive reactions and pedagogically more productive practices in classrooms. The inevitable conclusion from the evidence at hand is that using or integrating IT tools in visual arts education is effective. An active participation of most of the targeted respondents regarding various activities was outstanding.

Nevertheless, there were concerns mentioning that teachers' ICT application depends on delivered instruction topics. A successful learning process highly depends on its contents and teachers' teaching strategies. Teachers must be critical in choosing the best medium and strategies of instruction to determine learners' best practices in integrating ICT. In this study, most of the interviewed visual arts teachers used ICT as a teaching tool compared with other approaches. The basic use of ICT among visual arts teachers has created concerns among many researchers, indicating that visual arts teachers still lack knowledge and skills to incorporate ICT creatively in the art classroom.

This study also revealed that although teachers are aware of the benefits of using ICT in conducting better instruction, their proficiency, ability and readiness were reported as low because most visual arts teachers have moderate confidence levels in using ICT. This situation imposes some limitations blocking teaching confidence toward successful ICT integration into their instruction process. Since similar sentiments have been reported by previous researchers, this study's participant teachers, by expressing their wish for greater access to ICT for the fulfilment of their professional needs, underline the demand for the authorities' attention.

Regarding this research, support from school administrators was noted as a crucial factor in ensuring successful ICT integration into art classrooms. Unsupportive behaviour and disregarding the wish of teachers to integrate ICT in their courses was identified as professionally a demoralising factor. The necessity for continuous and relevant ICT-related courses, in terms of professional growth, has been mentioned.

In conclusion, visual arts teachers in Ghana avoid their application in visual arts education due to limited knowledge of ICT competencies because they ignore most of its possibilities and functions. Furthermore, they do not engage in collaborative work online with learners, or do not take virtual post-graduate educational courses. The teachers do not use the full potential of ICT in their instruction process but apply ICT commonly as a lesson delivery means, especially in delivering their instructional content. This mostly occurs among teachers with over 15 to 25 years of experience in classroom teaching. For these teachers, to accept new ICT understandably becomes a challenge too serious to overcome due to fear of exposing their empirical knowledge and professional self-esteem to open criticism.

In the traditional educational context in Ghana, the conclusions are significant as they reflect the current reality of insufficient pedagogical knowledge and approaches and the lack of proper training for prospective teachers to meet the 21st-century technological and the Fourth Industrial Revolution requirements. In the Arts Departments of senior high schools in Ghana, teachers are used in creating educational material for classroom teaching, but they typically support this material with traditional pedagogical tools. Without underestimating their value, this style of teaching lacks the balance between the content of empirical artistic knowledge and the artistic pieces designed through software programmes or research projects supported by ICT. Organising pedagogical activities supported by current technological tools and new virtual spaces, introduces new interactive activities and allows for collaborative work among communities. Therefore, the problem of poor implementation of ICT in the pedagogical competencies of visual arts teachers in Ghana is due to the reluctance to claim ownership of the potential of these technological tools to enhance their empirical knowledge of new learning experiences in visual arts. Teachers must perceive ICT in a dynamic and engaging way, considering the tasks and activities that learners can complete. By providing new platforms with greater variety of options, ICT offers learners opportunities to interact with other communities and broader their creative ability to design according with the environment communal needs**.**

7.1 Contributions

The success of educational changes depends on how teachers accept and address their implementation. Since the need for their positive attitudes and trust toward ICT is crucial, teachers must have the ultimate power to ensure successful integration. Comprehensive professional development courses must be continuously offered to teachers. It is hoped that

through relevant professional development courses, teachers will be exposed to more meaningful and creative use of ICT. Apart from enhancing teachers' confidence level, this initiative must be considered as one of the mechanisms in ensuring the full potential of ICT when skilfully and expertly used by teachers. Furthermore, cooperation with school administrators and support from the Ministry of Education in ensuring the availability of ICT-related facilities are essential for the successful ICT incorporation in visual arts.

This research also contributed to the body of knowledge by exploring the integration of technology and pedagogical approaches in the visual arts classroom in Ghanaian senior high schools. The study focused on the Technological Pedagogical and Content Knowledge (TPACK) framework and assessed the influence of technology on the development of learners as future creative thinkers and productive citizens. The research aimed to identify the technological tools used in teaching and learning, examine the use of modern technology and traditional tools, and assess the impact of their joint use on visual arts teaching and learning. As for this study's contribution, it generates awareness and adds value to the existing stock of knowledge on ICT integration into visual arts teaching and learning processes. Moreover, the generated knowledge is hoped to be used by interested scholars in their further research as updated and reviewed literature on the subject matter. Furthermore, I hope, the study provides substantiated information to guide the Ghana education system towards effective pedagogical strategies based on the integration of IT with existing tradition-based pedagogy in the visual arts classrooms and to update teachers' digital knowledge through in-service training.

This study informs school administrators, counsellors and policymakers to formulate policies that harmonise ICT and visual arts education to improve the teaching and learning of the subject. Therefore, this study aims at benefiting visual arts teachers and learners through awareness about the problems, fears and challenges regarding the integration of established approaches and the innovative based on technology tools and skills. It contributes to government efforts to efficiently equip schools with technologies while academically serving as a reference and constructive document. Learners develop independency and competency with adequate information on technology applications in a global market. Finally, policymakers could make bylaws fitting the school environment and foster IT as a significant factor in the existing teacher training programme for visual arts learners and teachers.

In as much as there are human problems all around, people will always try to think creatively

to bring a suitable solution through technology. The Fourth Industrial Revolution has come to stay and will turn the world around. Particularly in the world of work, it will enhance productivity that will, in turn, transcend to the rapid development of various countries. Today, technology is applied in all fields: automobile production, food processing, agriculture, oil fields, education, health, communication, hospitality and even management. Comparatively, it is far better with time management than human resources.

With or without technology, life must go on and nations are going to battle with unemployment that will be created as we advance in technology. If care is not taken, we will end up solving one problem and creating another alongside. Governments must be proactive in reasoning about what to do with its available labour force by balancing it with technology in a fair measure to improve people's standard of living. Again, the industrial waste and the pollution from some of these technologies will also harm us in the long term. For instance, many plastics have been used already but their disposal causes harm to society. Eventually, our arable lands will be taken over by these plastic materials and that alone will affect food production. The fisheries are not left out because running water directs most of these materials into the sea to destroy aquatic habitats.

We must embrace technology but also consider its dangers so that it does not victimise us. Technology creates many possibilities for the user. Bannon (2011) talks about a human-centred perspective and highlights that technology nowadays is presented as something humans live with and not something they use. Humans should not be forced into a technological environment; instead, technology should fit into their environment (Abowd et al. 2002). An example of technology that fits into the life of humans is the possibility to personalise one's smartphone, tablet or computer by downloading applications the user considers oneself to need. Applications can, for instance, support and encourage training and eating habits. Humans can use apps as assistance to navigate within new areas, get access to music, pictures, read newspapers, socialise with friends or perform banking transactions. It offers many possibilities when humans enter the world of applications and opportunities to encourage a more active lifestyle, inside and outside our home environment.

7.2 Recommendations

To guide learners and contribute nationally and internationally on studies about technology integration in teaching and learning visual arts, I was well equipped with much expertise.

Therefore, my recommendation will be based on this research and my personal, empirical knowledge on the subject matter with a focus on the design visual arts curriculum and integrated technology with the existing pedagogical approaches.

To this end, the following issues are recommended:

1. It is imperative to create more awareness on the importance of ICT in teaching and learning in Ghana. This might inform all concerned participants in organising workshops or training sessions to accommodate their training programmes through the direct access and connection with the Internet. Through this process, they will be exposed to the multifaceted use of ICT and learn though praxis how to support and enhance their teaching and learning class interaction.

2. Visual arts teachers who have been applying static approaches in their courses must bring changes in their pedagogical models through visual IT courses and exposure various subjects or blended classes. Supported by ICT, such an action-based experience can improve their pedagogical skills in terms of approaching the younger generation, understanding their future socio-professional needs, and enhancing their knowledge accordingly.

3. Since visual arts teachers must have supported access to the technological tools for developing their educational framework and context, the government should provide computers to public schools.

4. The educational authorities must consider alternatives to the electricity failure rate, as this study indicated this issue as the most serious factor, limiting the interest in innovation, awareness of advantages and disadvantages, acceptance of changes, adaptation and integrating ICT for visual arts teaching and learning courses.

5. To this end, creating technological tools for visual arts pedagogical purposes is crucial because it will offer teachers the platform to voice their related needs and, above all, select the proper tools for the support and fulfilment of their professional requirements.

6. In line with this initiative, visual arts teachers must be trained on how to incorporate ICT in their pedagogical competencies and using virtual platforms for virtual educational purposes.

7. For the stimulation of interest in research projects supporting and promoting the integration of ICT, the department must consider offering suitable rewards.

8. There is a need to continue the search for principles that will guide the fusion of traditional and innovative methods of teaching visual arts.

9. The ICT competencies of visual arts teachers in Ghana must be determined.

10. Incorporate ICT in the secondary visual arts classroom: a study of teachers' values, attitudes and beliefs.

11. Apply ICT assessment methods by visual arts teachers in Ghanaian senior high schools.

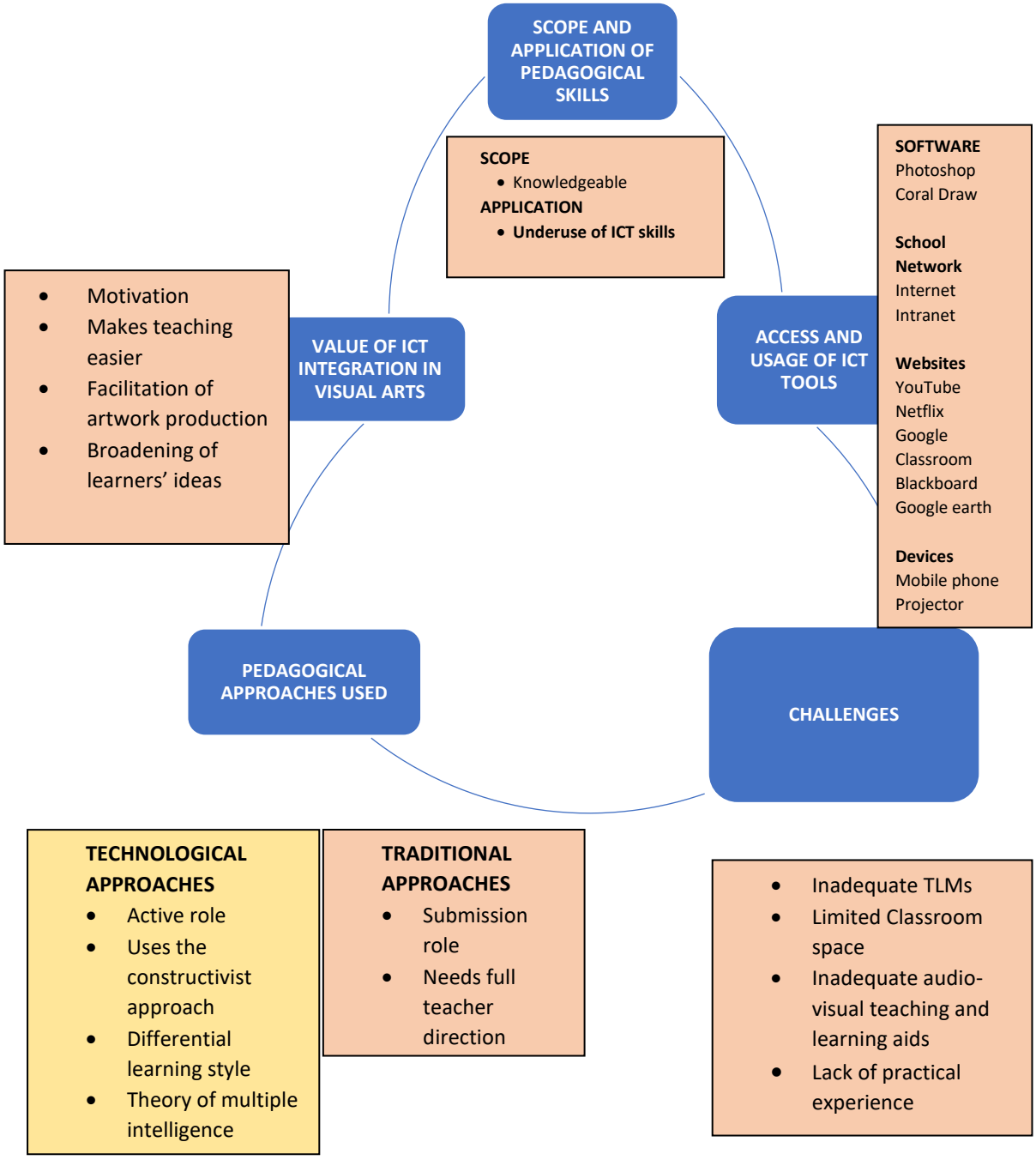

Figure 7.1 General conclusions (Bonney 2022)

7.3 Summary of the study

Under the title, how technology interacts with established pedagogical approaches and the degree of influence it exercises on the development of learners as future creative thinkers and productive citizens, this thesis is divided into seven chapters summarised as follows.

Chapter 1: Having introduced the primary purpose of this study, I developed the background defining the subject matter geo-politically, demographically and sets its historical and sociocultural framework. I have drawn the educational context within which the research has been conducted. Furthermore, I have defined my rationale and motivation, focus and purpose, my theoretical and conceptual framing, the research questions guiding the analysis, and ended with a brief description of the study's expected contributions, experienced limitations and the conclusion of this chapter. To bridge the existing gap among the pedagogical approaches presently applied in teaching and learning visual arts in Ghanaian senior high schools, the study has investigated the following relevant issues and controversies.

1. The existing technological tools used in teaching and learning visual arts classes

2. The way and extent at which modern technology and traditional tools are jointly used

3. The educational role of applying technological means in a visual arts class

4. The impact of merging technology and traditional approaches in teaching and learning

5. Critical analysis of this study in terms of related challenges and problems

6. Propose how best to adopt and adapt modern technological tools to facilitate practical training approaches for improving teaching and learning in the concerned schools

Chapter 2:
In this chapter I have discussed the existing scholar views and theories regarding my subject matter. The literature review was developed in relevance to my queries on how to integrate technology with other conventional approaches in education. In line with this, I have presented a clear picture of the dialectics between the existing, establish, familiar and the innovative, complicated and unfamiliar. In this chapter, I have tried to maintain my objectivity despite my unavoidable interpretative approach.

Chapter 3: I explained the theoretical framework sustaining my approach, methodology and my viewpoints on the use of technology in the most convenient way and in the Ghanaian sociocultural, economic and political context. Therefore, inspired by Shulman's (1986) PCK model and Koehler and Mishra's (2006) TPCK model, I have proposed a combined pattern to assist the teaching and learning process for a better understanding of ICT practices in their art studios and classrooms at Ghanaian senior high schools. In the African socio-economic and cultural context, learners form a highly multi-variant content in terms of knowledge acquisition levels. This fact pedagogically renders the instruction process extremely challenging for teachers, especially in their effort to unify their classes towards common goals. The most crucial contribution of my proposed methodological tool is opening a unique way of communication between teachers and learners, which willI believe, facilitate this adjustment process to innovative approaches in pedagogy.

Chapter 4: In this section, based on my theoretical framework, I present my research design and methodology, explain the reasons for my choice and approaches. In my discussion, I contextualise my methodological guidelines regarding the Ghanaian environmental realities and the framework of my research possibilities as set in my introductory chapter. In the context of my qualitative analytical angle, these possibilities refer to the study's trustworthiness, ethical considerations and fair acknowledgement of the circumstantial limitations.

Chapter 5: This chapter is crucial as it provides the required information reflecting the reality of the issues anticipated and presented at the initial stages of the study and justifies the visual arts validity of my theoretical framework. The opinions and voices of my research participants and the voiceless but equally eloquent artworks of the learners have proved most powerful factors to lead my way forward and to sustain my findings and relevant conclusions. In this chapter I analyse the collected and classified data in the following three parts.
Part 1 comprises open-ended interviews with the visual arts teachers, illustrates the strengths and shortcomings of the two opposed research poles (traditional teaching and learning approaches and technology-based education methods). Part 2 involves observations in the visual arts studios/classrooms. For the best results, I directed my focus on the artworks of the concerned learners according to my empirical knowledge and assessed them according to my expertise and proficiency in this field. Part 3 refers to the analysis of photographs taken from visual diaries or sketchbooks of learners from the selected schools. For analysing the

photographic material, I applied the open-coding method, which has sustained, and the relevant discussion and assessment of my data findings.

Chapter 6: This part comprises the findings of the entire study through a comprehensive discussion of the results under the following relevant themes:

- Identification of the technological tools used in the teaching and learning of visual arts
- Current approaches in teaching and learning visual arts at Ghanaian schools
- Access and usage of ICT tools at senior high schools
- Availability and challenges of ICT tools to the overall application in visual arts pedagogical approaches
- Pedagogical value of ICT integration with visual arts education-instituted approaches
- Visual arts skill technique development through integration of traditional and innovative pedagogical approaches

Chapter 7 presents the conclusions and recommendations of the study, followed by suggestions and guidelines for improving the status quo of the educational system in Ghana.

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APPENDICES

APPENDIX A

LETTER OF PERMISSION TO CONDUCT RESEARCH: GHANA EDUCATION SERVICE

Faculty of Education
Fakulteit Opvoedkunde
Lefapha la Thuto

Department of Humanities Education

Faculty of Education
University of Pretoria
Pretoria 0001
10 November

2020

Ghana Education Service
Ministry of Education
Ghana

Dear Sir/Madam

I am a registered student in the faculty of Education, (PhD) student at the University of Pretoria and my study title is "Pedagogical approaches in the use of technology for Visual Arts in Ghanaian High Schools".

The purpose of this study is to explore how teachers use ICT tools in the Visual Arts classroom and then assess the interactive communication between teacher-sender and learner-receiver within the context of the Technological Pedagogical and Content Knowledge (TPACK) as a research framework.

This letter serves to request your permission to conduct the aforementioned research study among a sample of four Akwapim South District Senior High Schools located in the Eastern region of Ghana. I would like to interview Visual Arts teachers in two lessons. I will be a passive observer who will use an observation sheet to take field notes while the teacher is busy in class. I want to gain an in-depth understanding and explore how teachers employ ICT tools during their lesson delivery. The interviews and observations (approximately 60 minutes each) will be completed during Semester 2 in the relevant schools. No video recordings will be made.

The following schools will possibly be involved in the study:

Category A: ABURI GIRLS SENIOR HIGH SCHOOL
Category B: ADONTEN SENIOR HIGH SCHOOL
Category C: ABURI PRESBY SENIOR HIGH SCHOOL
Category D: DIASPORA GIRLS SENIOR HIGH SCHOOL

I intend to collect data by:

a) Observing Form 2 learners and their teachers when they plan, present, and reflect on a lesson involving the use of ICT in the Visual Arts classroom. A total of two lessons will be observed;
b) Interviewing teachers on their experiences with the use of ICT during the stages mentioned above. The interviews will be about 60 minutes long and will be voice recorded;
c) Photographing learners' drawings, sketchbooks and artworks only;
d) Analysing the sketches, activities, drawing books, briefs and lesson plans created by teachers;
e) Going through all the different activity books for Visual Arts, prescribed books and any other policy documents that are used in Visual Arts, Form 2.

If the participants agree to take part in the study I will ensure that the following ethical principles are adhered to:

a) *Informed consent:* Consent to participate will be based on the participants' understanding of the purpose and process of the study as I would have explained to them.

b) *Voluntary participation*: Participants will voluntarily choose to participate without any coercion, and they are free to opt-out of participation at any time.

c) *Interview Schedule:* An interview schedule will be made available ahead of time. Interviews will be conducted at the participants' convenience.

d) *Safety in participation:* Participants will not be exposed to any risk or harm of any form. Social distancing measures will be observed under the COVID-19 Safety Protocols.

e) *Privacy*: The names of the school and identities of the participants will be treated confidentially, and will not be disclosed. The teachers will be referred to as teacher X, Y or Z, learners works photographed as work 1, 2 or 3 and the schools will be referred to as School A, B or C. The voice recorder will not be attached to the research report but will be summarised and analysed on the report not revealing the voices of the participants.

f) The normal teaching activities will not be disturbed, in particular, no tuition time will be lost, no incentives will be offered to any of the research participants, and there will be no implications for academic assessments for participation or nonparticipation.

g) The data that will be collected will be stored for 15 years in the supervisor's office at the University of Pretoria as per the rules and regulations of the University of Pretoria.

Your co-operation will be highly appreciated.

Yours sincerely

Mr Joseph Bonney

Dr Raita Steyn (Supervisor)

For any additional information, you may contact me, Joseph Bonney at +233244879557 or paakojo.gh75@gmail.com alternatively you may contact my supervisor, Dr Raita Steyn at +2782 4426190 or raita.steyn@up.ac.za

PERMISSION FOR RESEARCH

If permission is granted, please sign your consent with full knowledge of the purpose, nature and procedures of this research.

I,_____(your full name only), agree to allow **Joseph Bonney** to undertake the research project titled, "Pedagogical approaches in the use of technology for Visual Arts in Ghanaian High Schools" with Visual Arts teachers at the mentioned schools.

……

Signature of representative of GES

Name: …… **Date:** ……..

Mr. Joseph Bonney
P.O Box 88
Aburi, Ghana
Paakojo.gh75@gmail.com

Dear Sir/Madam

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN SCHOOLS

I am a registered student in the faculty of Education, (PhD) student at the University of Pretoria and my study title is "Pedagogical approaches in the use of technology for Visual Arts in Ghanaian High Schools".

The purpose of this study is to explore how teachers use ICT tools in the Visual Arts classroom and then assess the interactive communication between teacher-sender and learner-receiver within the context of the Technological Pedagogical and Content Knowledge (TPACK) as a research framework.

This letter serves to request your permission to conduct the aforementioned research study among a sample of schools in your district. I would like to invite your Visual Arts teacher to complete a questionnaire and do two lesson observations, which will not last more than 60 minutes each, to explore the ICT tools the teachers employ during their lesson delivery. I will be a passive observer who will use an observation sheet to take field notes while the teacher is busy in class. These questionnaires and observations will be completed during Semester 2 in your school. No video recordings will be made.

I have already been granted permission by the GES Director Office to carry out the study (the approval is attached hereto).

If permission is granted, I intend to collect data by:

f) Observing Form 2 learners and their teachers when they plan, present, and reflect on a lesson involving the use of ICT in the Visual Arts classroom. A total of two lessons will be observed;

g) Interviewing teachers on their experiences with the use of ICT during the three stages mentioned above. The interviews will be about 60 minutes long and will be voice recorded;
h) Photographing learners' drawings, sketchbooks and artworks only;
i) Analysing the sketches, activities, drawing books, briefs and lesson plans created by teachers;
j) Go through all the different activity books for Visual Arts, prescribed books and any other policy documents that are used in Visual Arts, Form 2.

If the participants agree to take part in the study I will ensure that the following ethical principles are adhered to:

h) *Informed consent:* Consent to participate will be based on the participants' understanding of the purpose and process of the study as I would have explained to them.

i) *Voluntary participation*: Participants will voluntarily choose to participate without any coercion, and they are free to opt-out of participation at any time.

j) *Interview Schedule:* An interview schedule will be made available ahead of time. Interviews will be conducted at the participants' convenience.

k) *Safety in participation:* Participants will not be exposed to any risk or harm of any form. Social distancing measures will be observed under the COVID-19 Safety Protocols.

l) *Privacy*: The names of the school and identities of the participants will be treated confidentially, and will not be disclosed. The teachers will be referred to as teacher X, Y or Z, learners work photographed as work 1, 2 or 3 and the schools will be referred to as School A, B or C. The voice recorder will not be attached to the research report but will be summarised and analysed on the report not revealing the voices of the participants.

m) The normal teaching activities will not be disturbed, in particular, no tuition time will be lost, no incentives will be offered to any of the research participants, and there will be no implications for academic assessments for participation or nonparticipation.

n) The data that will be collected will be stored for 15 years in the supervisors' office

at the University of Pretoria as per the rules and regulations of the University of Pretoria.

Lastly, I also would like to request your permission to use your data for further research purposes, as the data sets are the intellectual property of the University of Pretoria. Further research may include secondary data analysis and using the data for teaching purposes. The confidentiality and privacy applicable to this study will be binding on future research studies.

Your co-operation will be highly appreciated.

Yours sincerely

Mr Joseph Bonney

Dr Raita Steyn (Supervisor)

For any additional information, you may contact me, Joseph Bonney at +233244879557 or paakojo.gh75@gmail.com alternatively you may contact my supervisor, Dr Raita Steyn at +2782 4426190 or raita.steyn@up.ac.za

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PERMISSION FOR RESEARCH

If permission is granted, please sign your consent with full knowledge of the purpose, nature and procedures of this research.

I,_____(your name only), agree to allow **Joseph Bonney** to undertake the research project titled, "Pedagogical approaches in the use of technology for Visual Arts in Ghanaian High Schools" with Visual Arts teachers at _____ (name of school).

Signature of Headmaster

Date

Mr. Joseph Bonney
P.O Box 88
Aburi, Ghana
Paakojo.gh75@gmail.com

Name of Participant: _____

Pseudo name: _____

Dear Sir/Madam

RE: LETTER OF CONSENT TO PARTICIPATE IN THE RESEARCH STUDY

I am a registered student in the faculty of Education, (PhD) student at the University of Pretoria and my study title is "Pedagogical approaches in the use of technology for Visual Arts in Ghanaian High Schools".

The purpose of this study is to explore how teachers use ICT tools in the Visual Arts classroom and then assess the interactive communication between teacher-sender and learner-receiver within the context of the Technological Pedagogical and Content Knowledge (TPACK) as a research framework.

This letter serves to request your permission to conduct the aforementioned research study among a sample of schools in your district. I would like to invite you to complete a questionnaire and allow me to do two lesson observations, which will not last more than 60 minutes each, to explore ICT tools are employed during your lesson delivery. I will be a passive observer who will use an observation sheet to take field notes while you are busy in class. These questionnaires and observations will be completed during Semester 2 in your school. No video recordings will be made.

I have already been granted permission by the GES Director Office and the Headmaster, to carry out the study (the approval is attached hereto).

If permission is granted, I intend to collect data by:

k) Observing Form 2 learners in your class when they plan, present, and reflect on a lesson involving the use of ICT in the Visual Arts classroom. A total of two lessons will be observed;
l) Interviewing you on your experiences with the use of ICT during the three stages mentioned above. The interviews will be about 60 minutes long and will be voice recorded;
m) Photographing learners' drawings, sketchbooks and artworks only;
n) Analysing the sketches, activities, drawing books, briefs and lesson plans created by teachers;
o) Go through all the different activity books for Visual Arts, prescribed books and any other policy documents that are used in Visual Arts, Form 2.

If you agree to take part in the study I will ensure that the following ethical principles are adhered to:

o) *Informed consent:* Consent to participate will be based on your understanding of the purpose and process of the study as I would have explained it.

p) *Voluntary participation*: Choose to participate without any coercion, and you are free to opt-out of participation at any time.

q) *Interview Schedule:* An interview schedule will be made available ahead of time. Interviews will be conducted at your convenience.

r) *Safety in participation:* You will not be exposed to any risk or harm of any form. Social distancing measures will be observed under the COVID-19 protocol measures.

s) *Privacy*: Your name and the name of your school will be treated confidentially, and will not be disclosed. The teachers will be referred to as teacher X, Y or Z, learners works photographed as work 1, 2 or 3 and the schools will be referred to as School A, B or C. The voice recorder will not be attached to the research report but will be summarised and analysed; no voices of the participants will be revealed.

t) The normal teaching activities will not be disturbed, in particular, no tuition time will be lost, no incentives will be offered to any of the research participants, and there will be no implications for academic assessments for participation or nonparticipation.

u) The data that will be collected will be stored for 15 years in the supervisors' office at the University of Pretoria as per the rules and regulations of the University of Pretoria.

Lastly, I also would like to request your permission to use your data for further research purposes, as the data sets are the intellectual property of the University of Pretoria. Further

research may include secondary data analysis and using the data for teaching purposes. The confidentiality and privacy applicable to this study will be binding on future research studies.

Your co-operation will be highly appreciated.

Yours sincerely

Mr Joseph Bonney

Dr Raita Steyn (Supervisor)

For any additional information, you may contact me, Joseph Bonney at +233244879557 or paakojo.gh75@gmail.com alternatively you may contact my supervisor, Dr Raita Steyn at +2782 4426190 or raita.steyn@up.ac.za

PERMISSION FOR RESEARCH

If permission is granted, please sign your consent with full knowledge of the purpose, nature and procedures of this research.

I,_____(your name only), agree to allow **Joseph Bonney** to undertake the research project titled, "Pedagogical approaches in the use of technology for Visual Arts in Ghanaian High Schools" and include me as a participant in his research as I teach Visual Arts at _____ (name of school).

Signature of Visual Arts Teacher

Date

Mr. Joseph Bonney

P.O Box 88
Aburi, Ghana
Paakojo.gh75@gmail.com

PARENT/GUARDIAN CONSENT FORM

REQUEST FOR PERMISSION FOR YOUR CHILD TO PARTICIPATE IN THE RESEARCH STUDY

Dear Parent/Guardian,

My name is Joseph Bonney currently enrolled to complete a PhD (Humanities Education) at the University of Pretoria. My study title is "Pedagogical approaches in the use of technology for Visual Arts in Ghanaian High Schools".

The purpose of this study is to explore how teachers use ICT tools in the Visual Arts classroom and then assess the interactive communication between teacher-sender and learner-receiver within the context of the Technological Pedagogical and Content Knowledge (TPACK) as a research framework.

This letter serves to request your permission for me to observe Visual Arts lessons in your child's class when the lessons are taught. The headmaster, district director, and GDE Head Office have already granted permission in this regard.

If you grant permission to my request, I will collect data by observing two Visual Arts lessons taught by the Visual Arts teacher in your child's class.

The observation will take place at school during your child's class period with the Visual Arts teacher present for approximately 60 minutes. After completion of the practical task for semester 2, the drawings and visual diary will be photographed to be used for analysis and supportive data in the thesis.

Note that if you allow me to observe the lesson taught in your child's class I will ensure that the following ethical principles are adhered to:

a) *Informed consent*: You consent to your child's participation based on your understanding of the purpose and process of the study as I (the researcher) have explained to them.

b) *Voluntary participation*: Your voluntarily consent to your child's participation without any coercion, and you are free to withdraw her/his participation at any time.

c) *Safety in participation*: Your child will not be exposed to any risk or harm of any form. Social distancing measures will be observed under the COVID-19 Safety Protocols.

d) *Privacy*: The information obtained from this study will be treated in the strictest confidentiality possible, and it will be used for research purpose only. Your child's identity and the data provided will be kept confidential and anonymous and used

strictly for the purpose of my research study. The names of the school and identities of the participants will be treated confidentially, and will not be disclosed. The teachers will be referred to as teacher X, Y or Z, learners works photographed as work 1, 2 or 3 and the schools will be referred to as School A, B or C.

e) The normal teaching activities will not be disturbed, in particular, no tuition time will be lost, no incentives will be offered to any of the research participants, and there will be no implications for academic assessments for participation or nonparticipation.

f) The data that will be collected will be stored for 15 years in the supervisors' office at the University of Pretoria as per the rules and regulations of the University of Pretoria.

In addition, I grant the University of Pretoria permission to use the data my child may provide for this study, confidentially and anonymously, for further research purposes, as the data sets are the intellectual property of the University of Pretoria. Further research may include secondary data analysis and using the data for teaching purposes. The confidentiality and privacy applicable to this study will be binding on future research studies.

Yours sincerely

Mr J Bonney

Dr Raita Steyn (Supervisor)

For any additional information, you may contact me, Joseph Bonney at +233244879557 or paakojo.gh75@gmail.com alternatively you may contact my supervisor, Dr Raita Steyn at +2782 4426190 or raita.steyn@up.ac.za

LETTER OF CONSENT TO PARTICIPATE IN THE RESEARCH STUDY

Dear Mr Bonney

Given the above information, I give consent for my child to voluntarily participate in the study.

I (full name of the parent/guardian), ……, voluntarily and willingly grant consent for my child (full name of child) ……., to participate in the study titled: "Pedagogical approaches in the use of technology for Visual Arts in Ghanaian High Schools".

I understand that my child's participation in the aforementioned study to which I am consenting, will involve the observation of two Visual Arts lessons taught in my child's class and the photographing of his/her drawings and sketches/visual diary.

I declare that I understand, as you explained to me, the purpose and procedures of the study and that you subscribe to ethical research principles, including the following:

- *Privacy*: My name(s), my child's name and the data/information my child may provide will be kept confidential and anonymous. My name and my child's name will not be revealed in any publication or any other method through which the findings of this study will be disseminated. The teachers will be referred to as teacher X, Y or Z, learners works photographed as work 1, 2 or 3 and the schools will be referred to as School A, B or C.

_____	_____	_____
(**Name** and **surname**)	Signature	Date

DATA COLLECTION: CLASSROOM OBSERVATION SCHEDULE

Name of school (code): ……

Date: ……..

Subject observed: ……

Components: ……..

Name of teacher (code): ……

Starting time: …… End time: ……

Number of learners: ……

Observer's name: ……

The following aspects were observed during the lesson in the classroom:

Topic	Findings/Comment
Planning and preparation	
Time allocation per activity	
Teaching /classroom arrangement.	
Mode/method of teaching	
Technology use/d in class	
Effective application of technology by Teacher's	
Teacher experience/teacher's technology use/d	
Resources used – e.g. available software application, computer devices, instructional materials –eg brush paint, and others	
Assessment materials	
Learners' participation (in relation to TPACK - which involves learning, attention and problem solving through a network participation etc)	

Feedback from learners during lesson (in relation to TPACK)	
Compared to the use of traditional tools, to what extend is modern technology used?	
Classroom management	
Lesson delivery	
Presentation challenges	

The following aspects were checked in the learners' visual diaries/drawing books:

Topic	Findings/Comment
Components covered	
Alignment of activities and planning	
Number of activities per component	
Number of activities per component that involve traditional medium	
Number of activities per component that involve technology	
The use of traditional tools (pencils, charcoal, paint etc) – amount	
The use of ICT to support (pencils, charcoal, paint etc) –	
Connectivism underscores how internet technologies (web browsers and other search engines) contribute to new approaches of learning. Comment these new approaches as reflected in the drawing book/visual diary	
Compared to the use of traditional tools, to what extend is modern technology used? And for what?	
Control and feedback to learners	
Corrections	

Interview schedule for teachers

Research title: Pedagogical approaches in the use of technology for Visual Arts in Ghanaian High Schools

Interviewer: _____

Interviewee: _____

Please answer the following questions as far as you understand them

Section A:

Demographic Information of Participant

Date of the interview: ……....

Place of the interview: …… ……...

Name of the school: …… ……...

Name of the teacher: …… …...……...……

Form Level: …… ……

Highest level education attained (qualification): …… ……

Work experience in teaching VA in high schools:

……..

……...…

Gender: …… …….....……

Age: ……

Number of learners in VA class: ……

Contact details: ……..

Duration of interview: …….

Start time:…… …… End time:…… ……

Section B:

1. Kindly tell me about yourself and your involvement in your current schools. Other schools you have taught? Other subjects that you have taught?

_____

2. How long have you been teaching the subject VA?

_____

3. Give a summative description of your school and then the VA classroom.

_____

4. Share your thoughts about the **general background** of learners in your school.

_____ _____

5. Give your definition of technology and what it entails.

_____

6. How often do you use technology for teaching and learning in the VA classroom?

____

7. Which ICT tool (s) do you use MOST for Teaching VA theory?

_____

8. Which ICT tool (s) do you use MOST for Teaching VA practical?

_____.

9. What is your confidence level in teaching VA?

_____

b) What is your confidence level in using technology in teaching VA?

_____.

10. What are the current challenges faced as a VA teacher in teaching and learning?

___

11. How do you interpret the use of Technology in the VA teaching and learning classroom?

_____

12. What are some of the **factors** that influence the quality of teaching and learning VA in your school?_____

13. How do you interpret the VA (drawing and planning) process?

____

14. Do you allow learners to use ICT in their drawings/planning of their final artworks

____

15. In relation to the answer above, why do so? What advantage or disadvantage is there in the use of ICT in the VA drawing process (planning and drawing)

___

16. Does ICT enhance collaboration among learners and teachers? Explain in full.

_____

17. Do you use ICT for teaching purposes?

___

18. How often to do you use ICT/computer for teaching purposes?

___

19. It is difficult to integrate ICT into teaching of Visual Arts? Why do you say so?

_____

20. Do you allow learners to access internet for information concerning your subject? Why?

_____

21. How do teachers approach their own ICT learning?

___

22. Share your thoughts on factors that greatly affect learner's motivation and performance in VA in high schools.

---

23. Tell me about the availability and quality of resources in your school. Then specifically for the Visual Arts class.

___

24. How can integrating of technology and traditional tools improve visual arts teaching and learning at the Ghanaian SHS?___

Section C: Please indicate which tools listed below you have (a) access to and (b) how you use it								
Q/N	Type of ICT	Use for Teaching		Use for Lesson Preparation		Use for Personal Development		Comments
		Yes	No	Yes	No	Yes	No	
25	Mobile Devices							
26	Personal Computer							
26	Internet							
27	Intranet (e.g. school network)							
28	Digital Camera							
29	Projector							
30	CD/DVDs							
31	Printer							
32	Scanner							
33	Television							
34	Smartboard & Whiteboard Apps. (Eg. Jamboard, Educreations, etc.)							
35	Microsoft Office (Word, Excel, Access, PowerPoint, Loom, etc.)							
36	Software (Eg. Photoshop, CorelDraw, Sketchpad etc.)							
37	Social Media (WhatsApp, Twitter, Skype, Facebook, Instagram, Messenger)							
38	Video Websites (Eg. YouTube, Netflix, Vimeo, etc.)							
39	Video Conference (Zoom, Google meets, Teams, etc.)							
40	Cloud Storage Service (Eg. OneDrive, iCloud, etc.)							
41	Learning Management System (LMS) (e.g. Google Classroom, Moodle, Blackboard, etc.)							
42	Online word processors (Eg. Google Docs, Zoho Writer, etc)							
43	Note Sharing (Eg. Evernote, OneNote, etc.)							

DATA COLLECTION: CLASSROOM OBSERVATION SCHEDULE

Name of school (code): ……

Date: ……..

Subject observed: ……

Components: ……..

Name of teacher (code): ……

Starting time: …… End time: ……

Number of learners: ……

Observer's name: ……

The following aspects were observed during the lesson in the classroom:

Topic	Findings/Comment
Planning and preparation	
Time allocation per activity	
Teaching /classroom arrangement.	
Mode/method of teaching	
Technology use/d in class	
Effective application of technology by Teacher's	
Teacher experience/teacher's technology use/d	
Resources used – e.g. available software application, computer devices, instructional materials –eg brush paint, and others	
Assessment materials	
Learners' participation (in relation to TPACK - which involves learning, attention and problem solving through a network participation etc)	

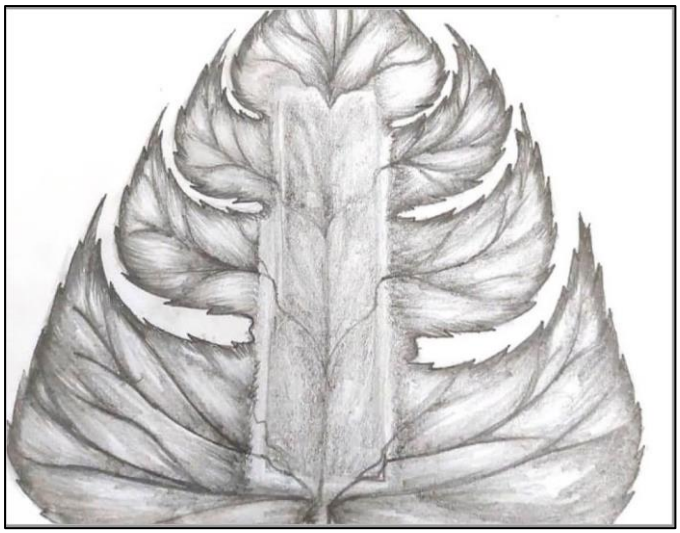
Feedback from learners during lesson (in relation to TPACK)	
Compared to the use of traditional tools, to what extend is modern technology used?	
Classroom management	
Lesson delivery	
Presentation challenges	

The following aspects were checked in the learners' visual diaries/drawing books:

Topic	Findings/Comment
Components covered	
Alignment of activities and planning	
Number of activities per component	
Number of activities per component that involve traditional medium	
Number of activities per component that involve technology	
The use of traditional tools (pencils, charcoal, paint etc) – amount	
The use of ICT to support (pencils, charcoal, paint etc) –	
Connectivism underscores how internet technologies (web browsers and other search engines) contribute to new approaches of learning. Comment these new approaches as reflected in the drawing book/visual diary	
Compared to the use of traditional tools, to what extend is modern technology used? And for what?	
Control and feedback to learners	
Corrections	

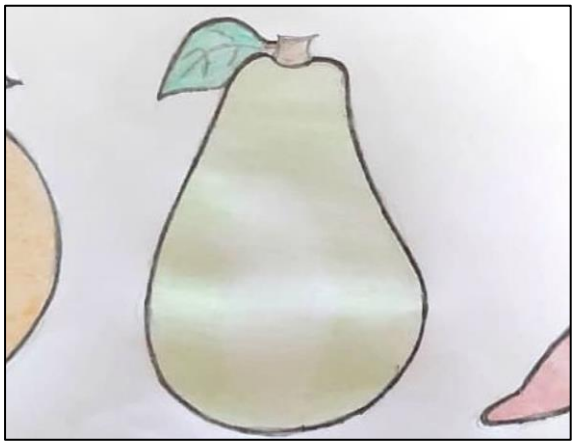
APPENDIX B

DATA COLLECTION: CLASSROOM OBSERVATION SCHEDULE



Ssh A learner1.pdf

Ssh A learner2.pdf



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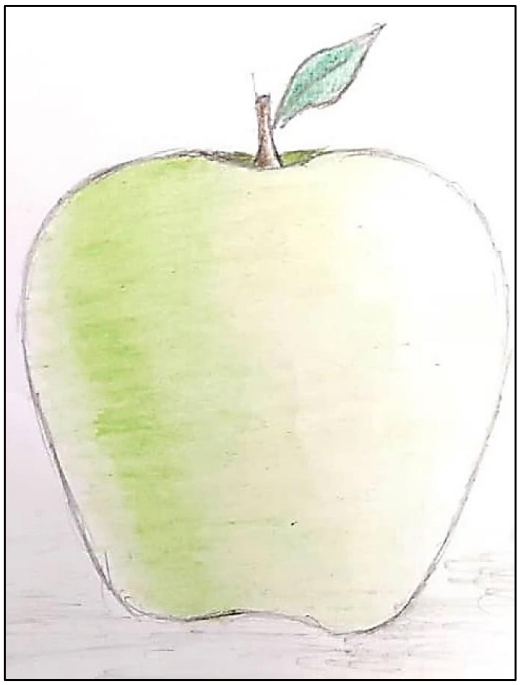

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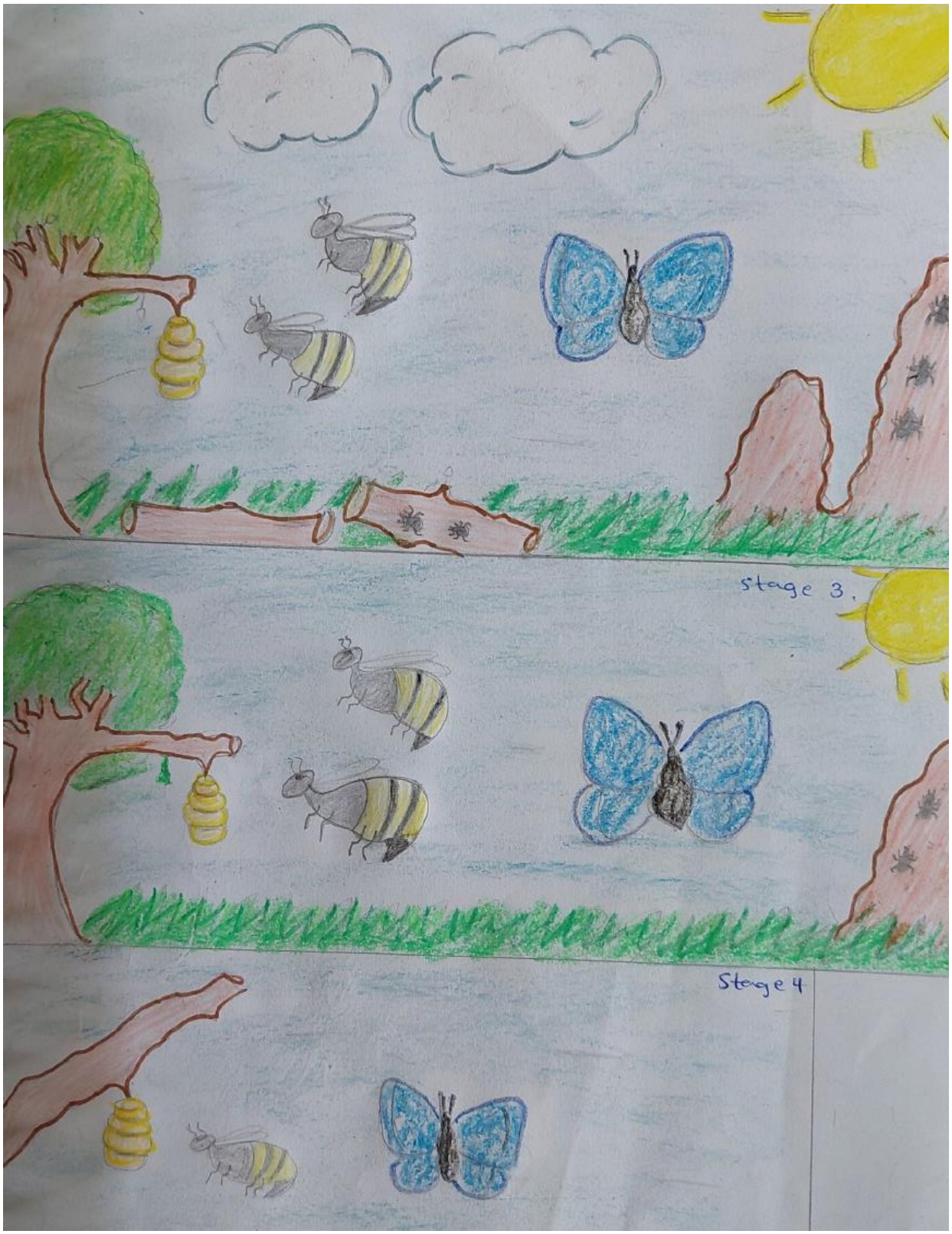

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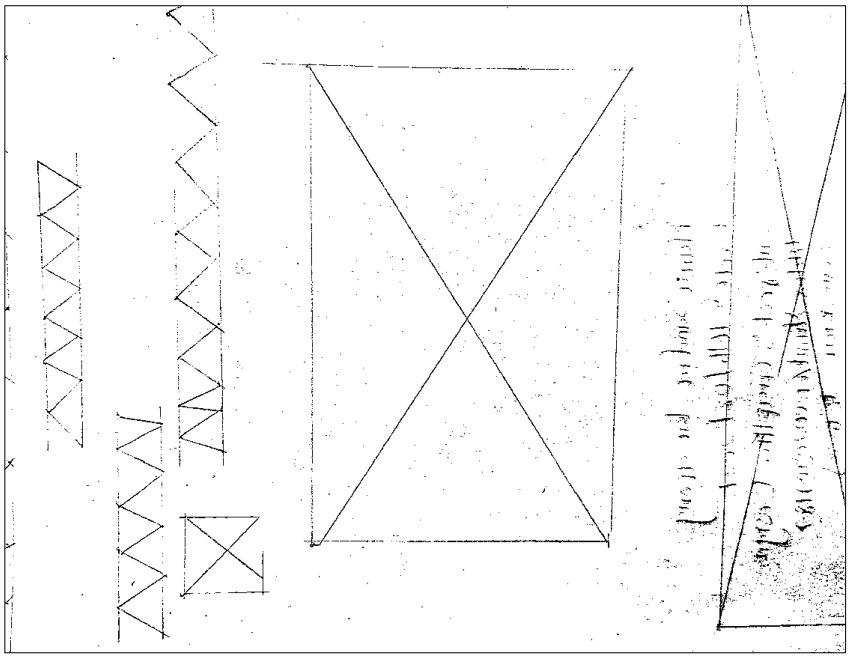

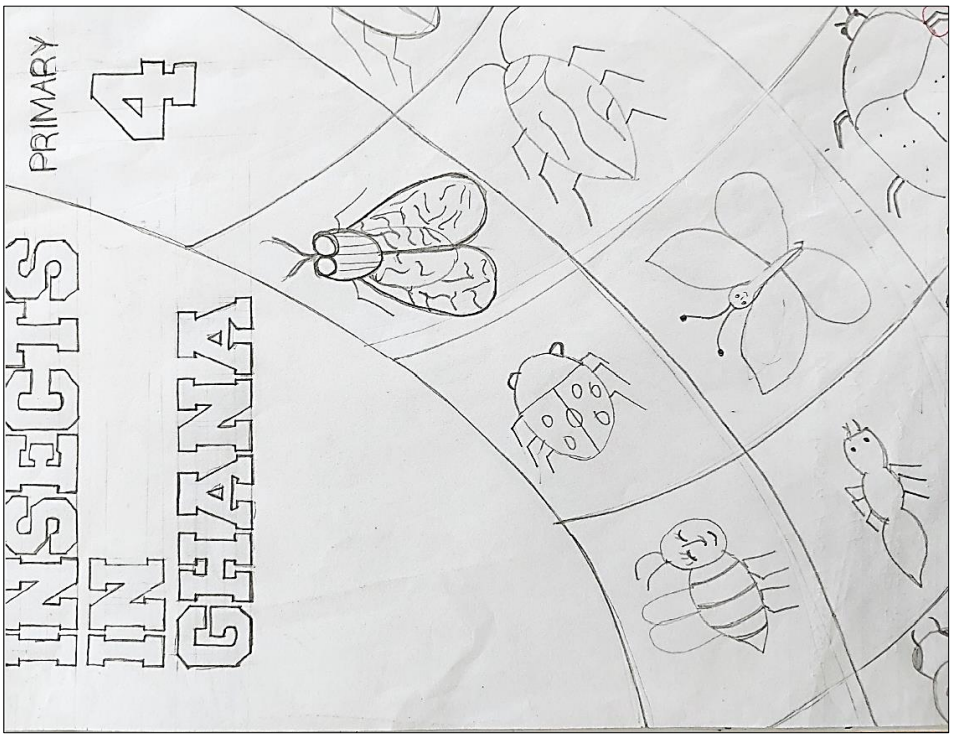

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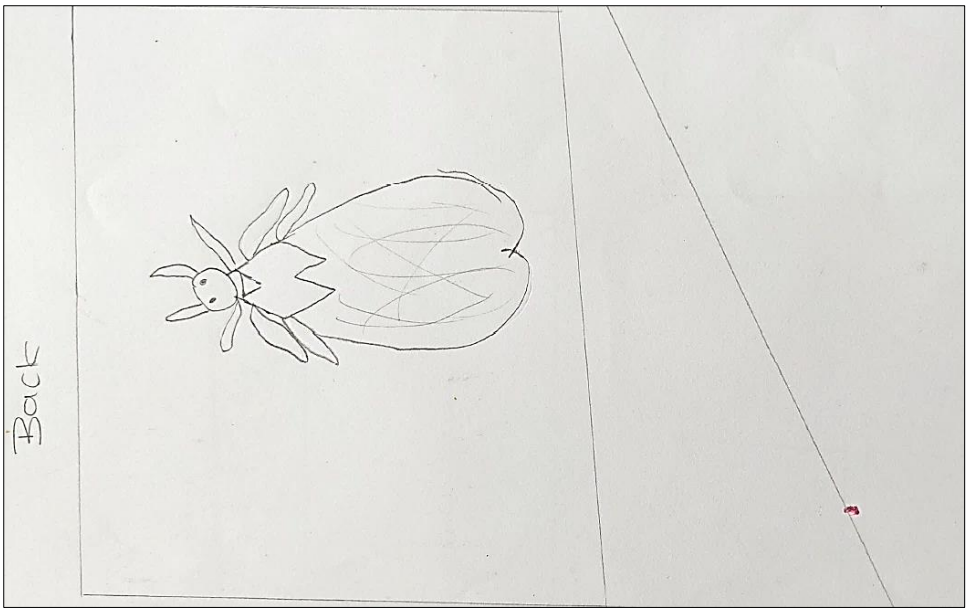

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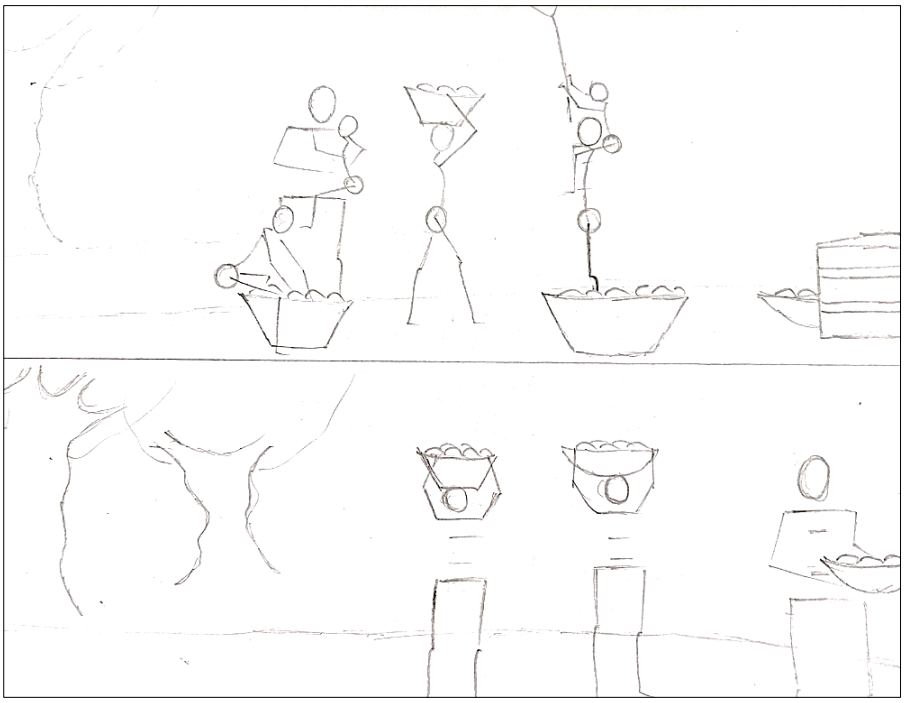

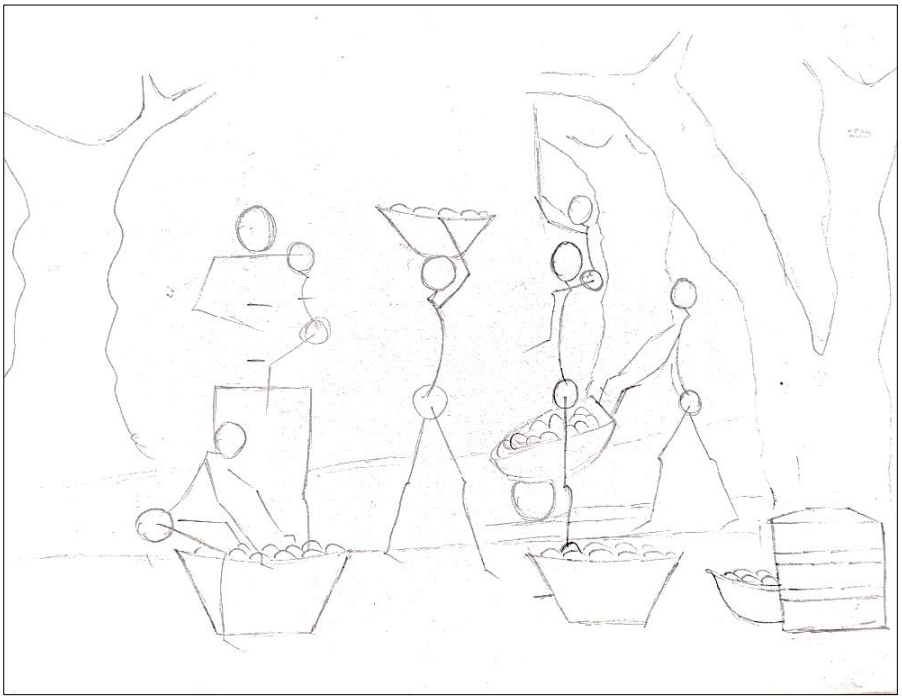

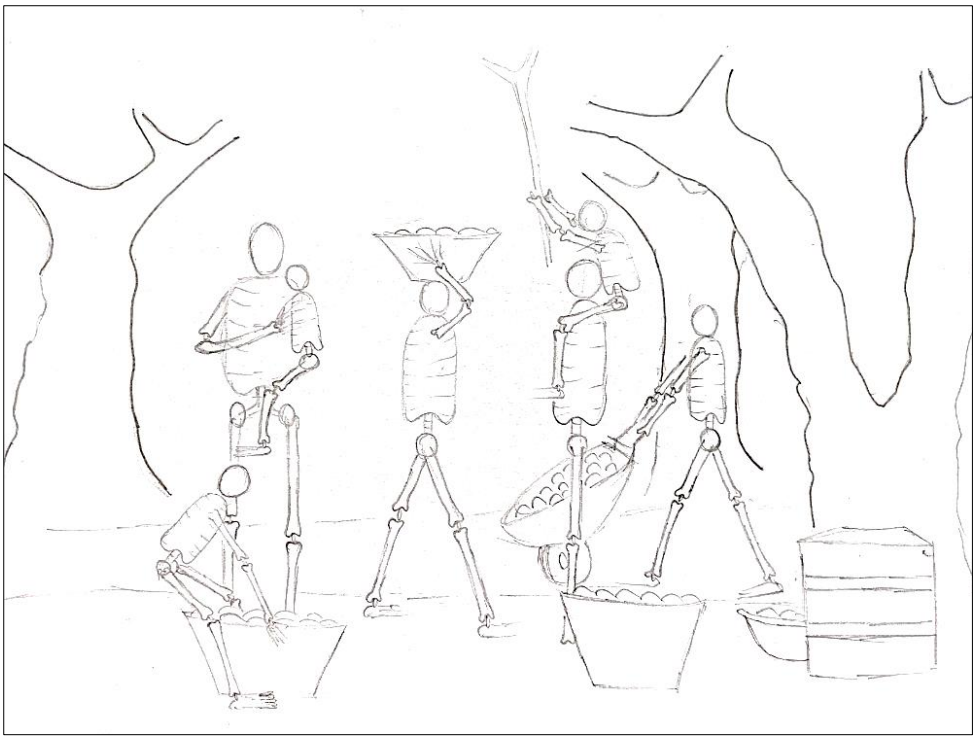

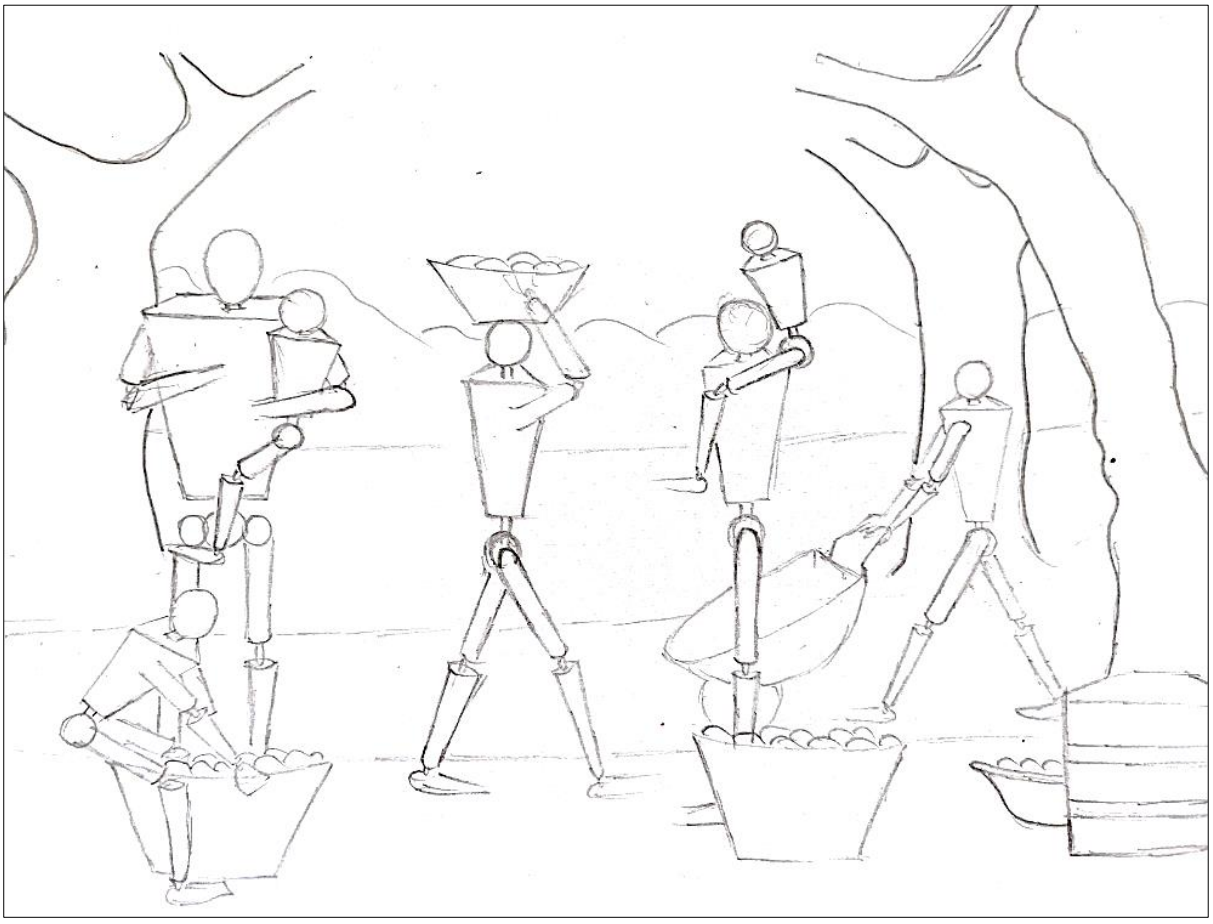

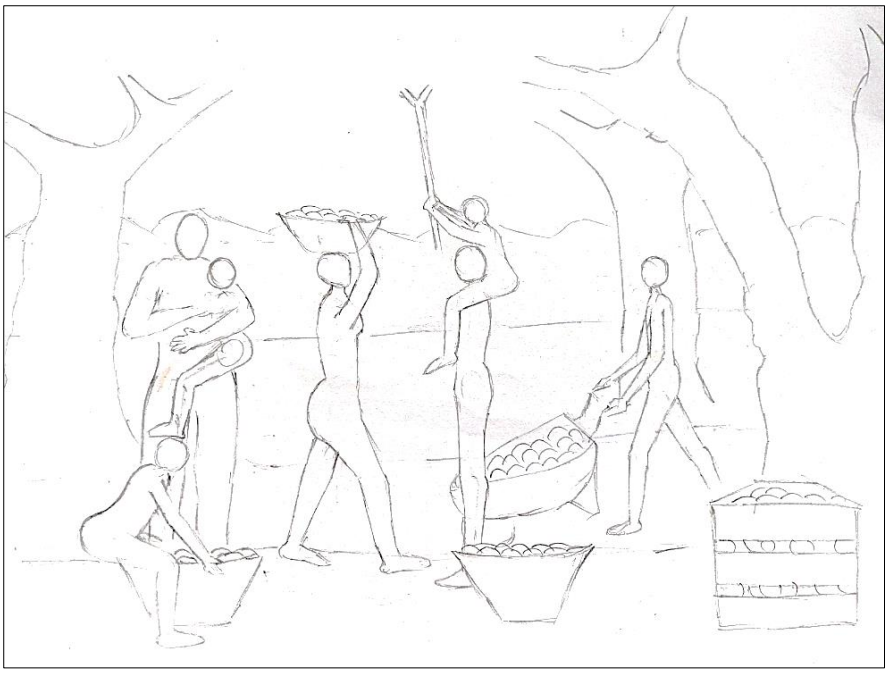

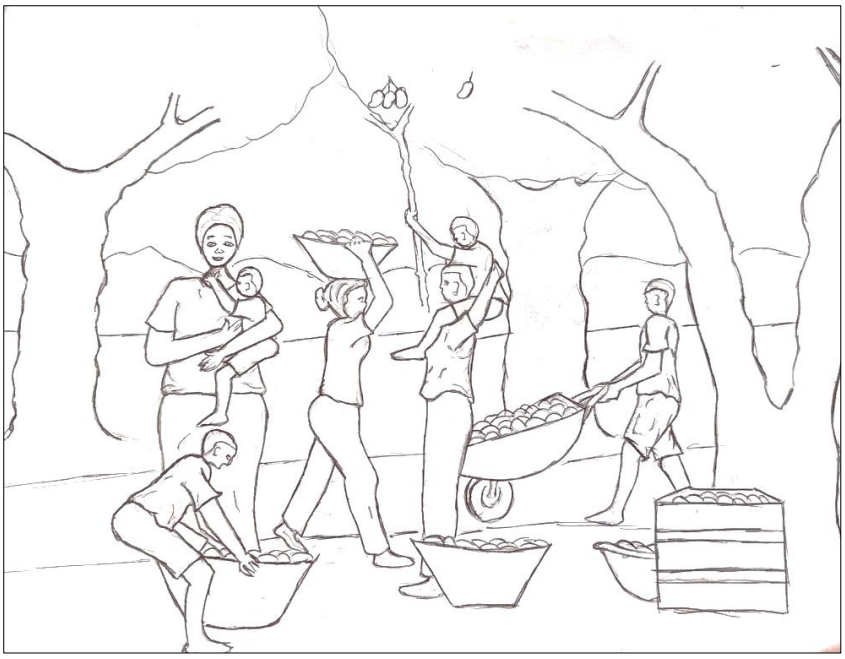

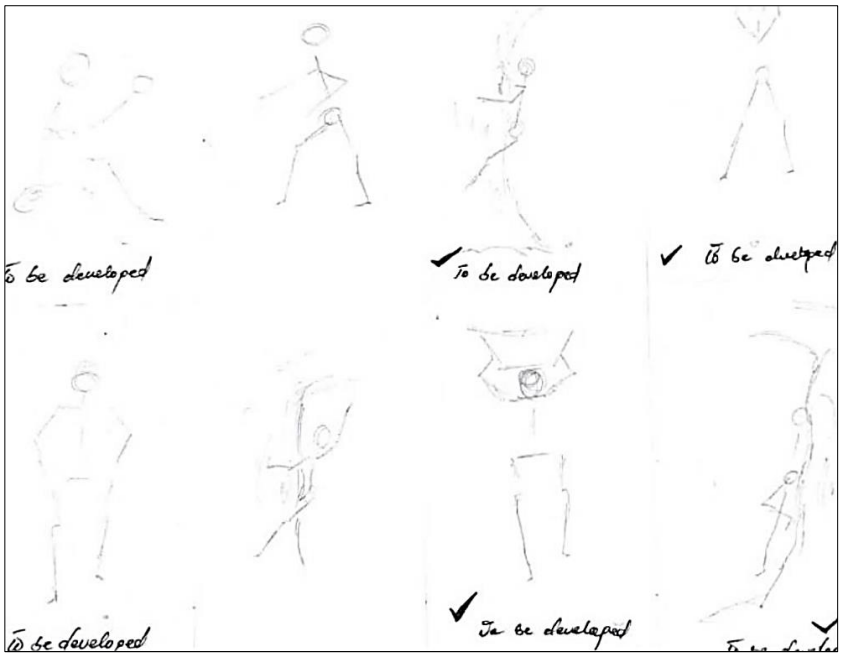

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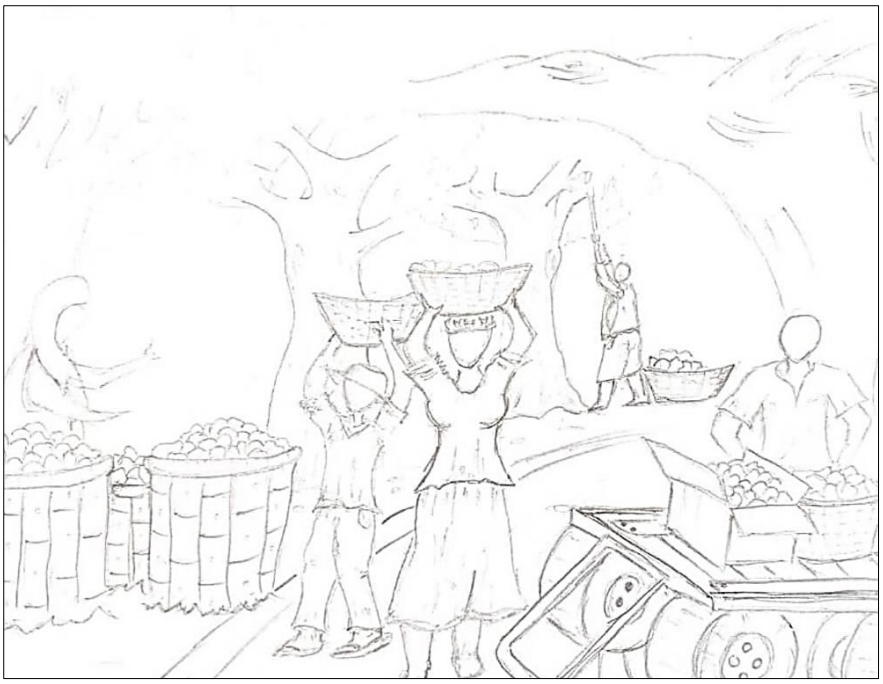

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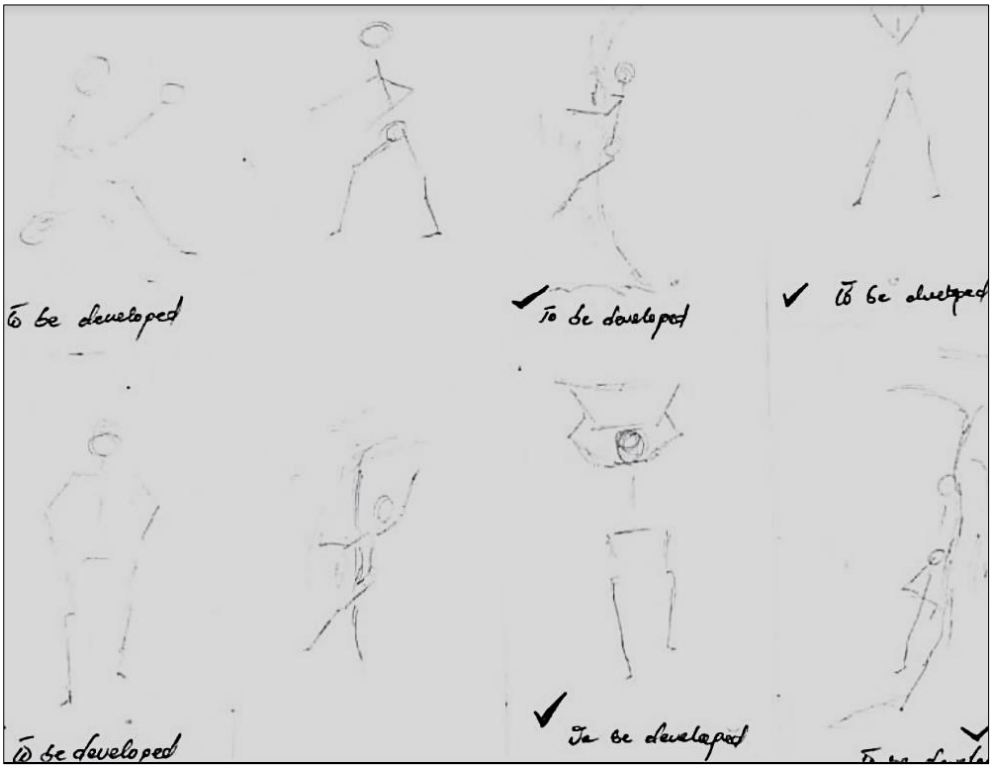

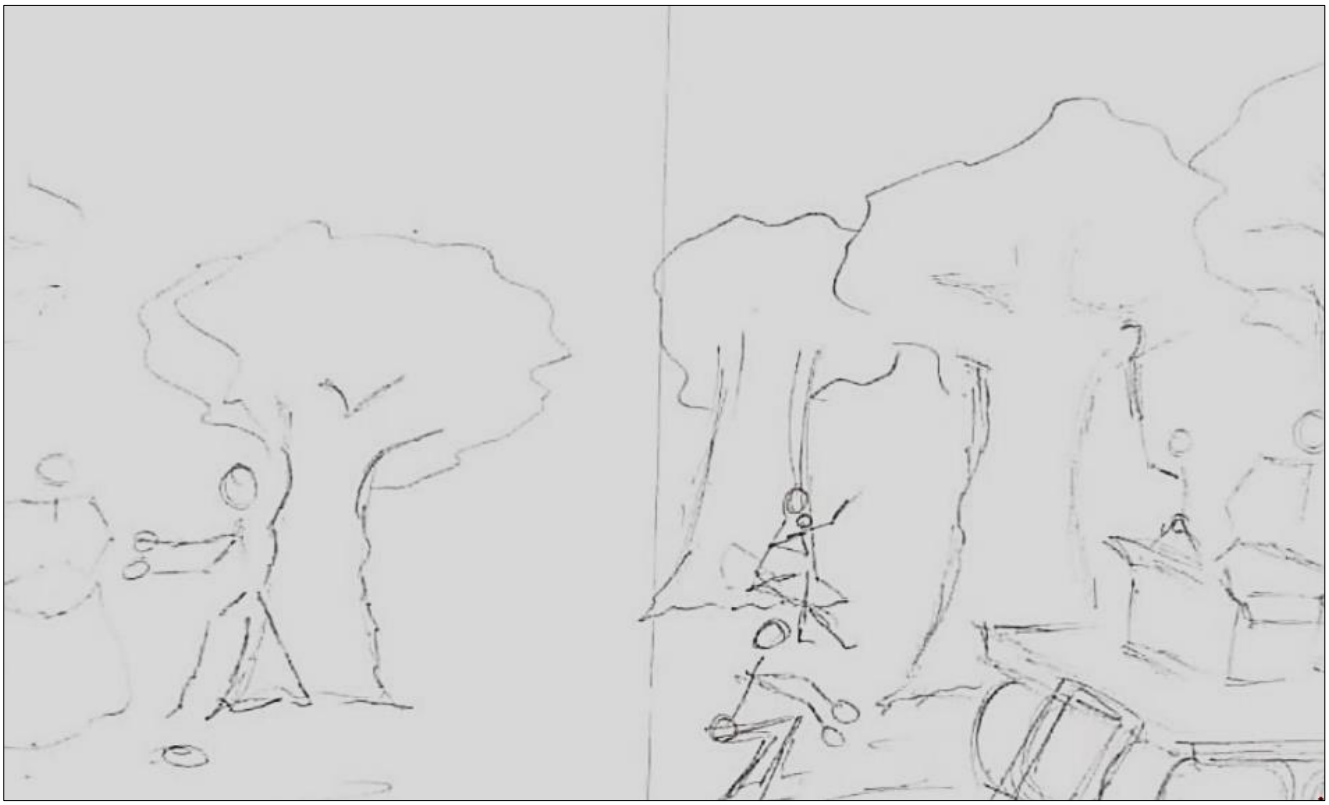

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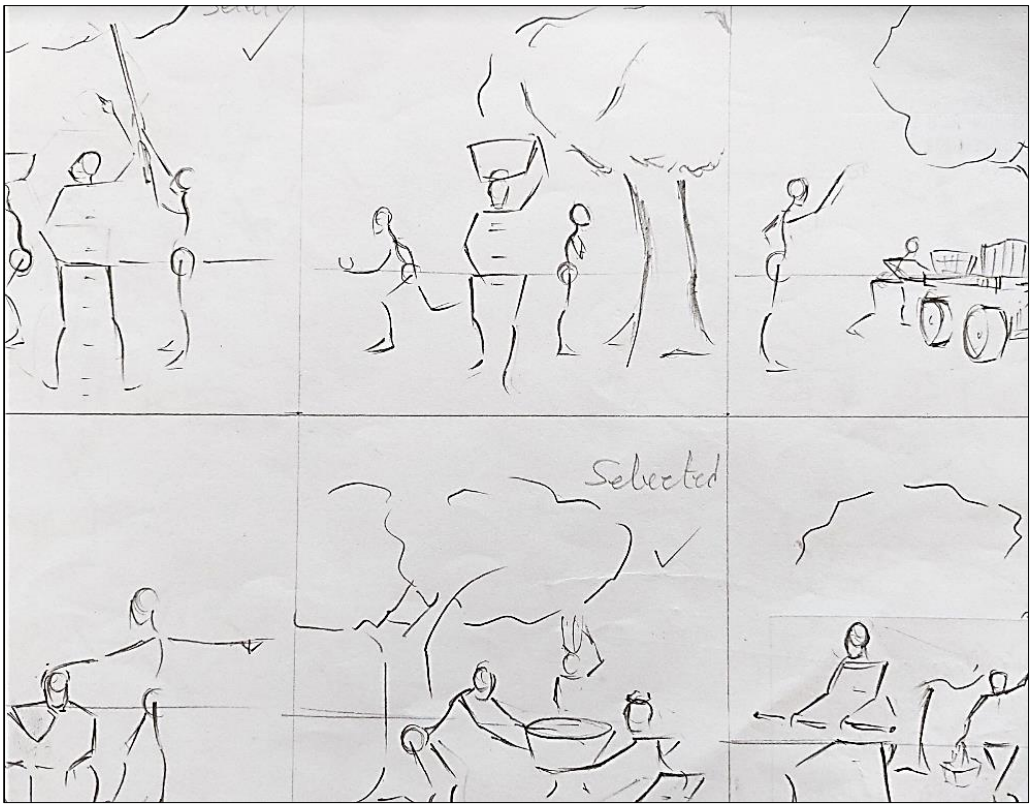

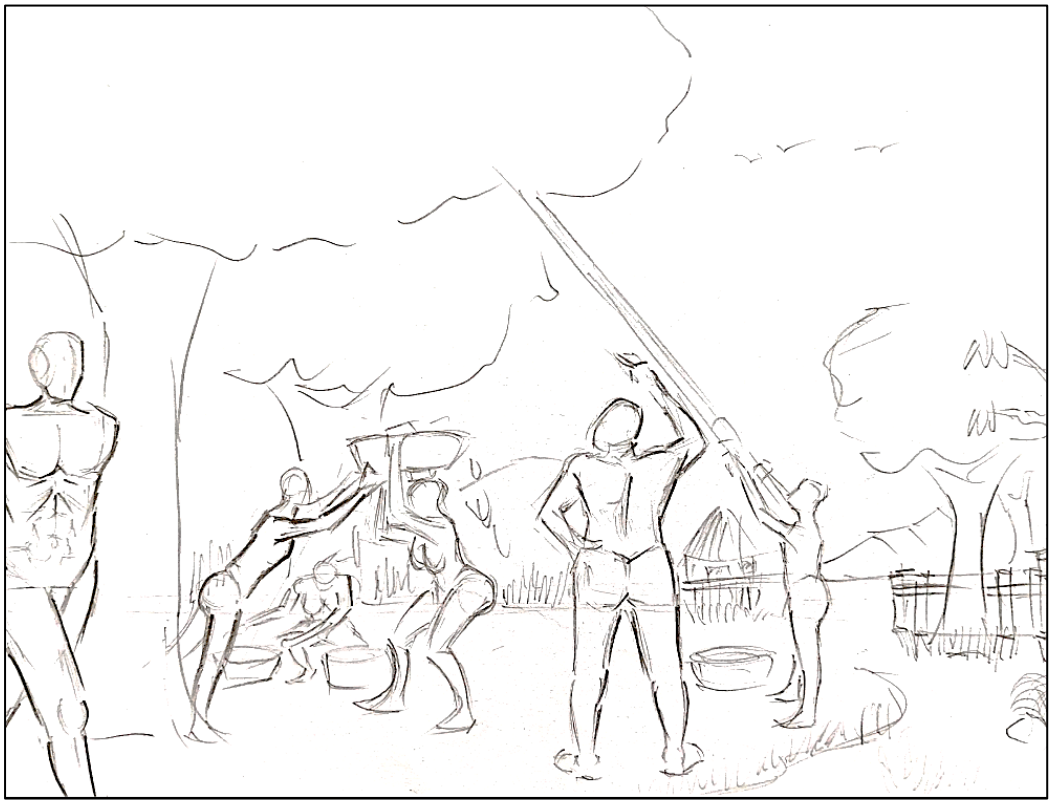

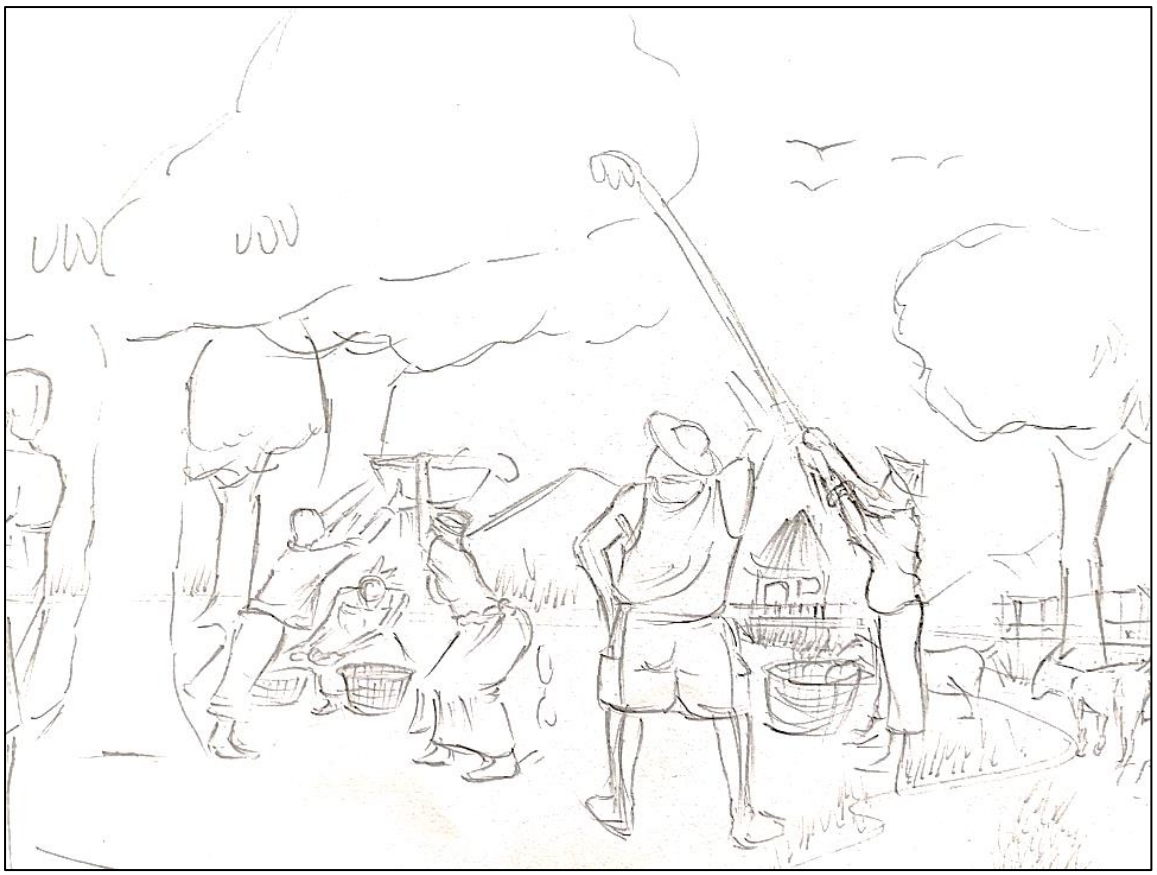

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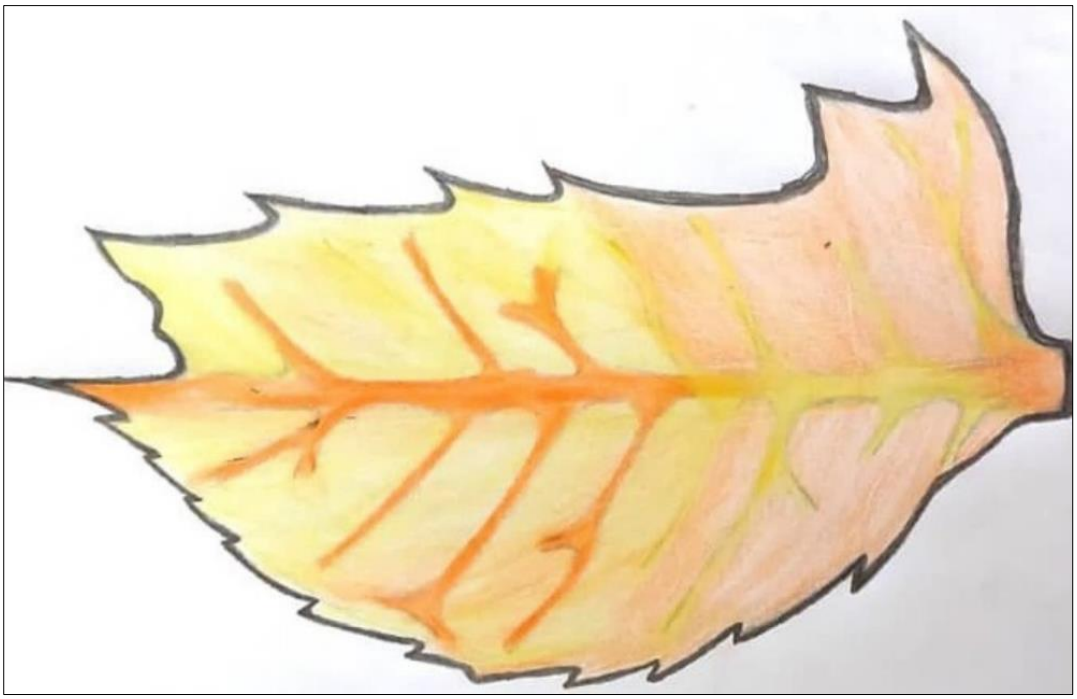

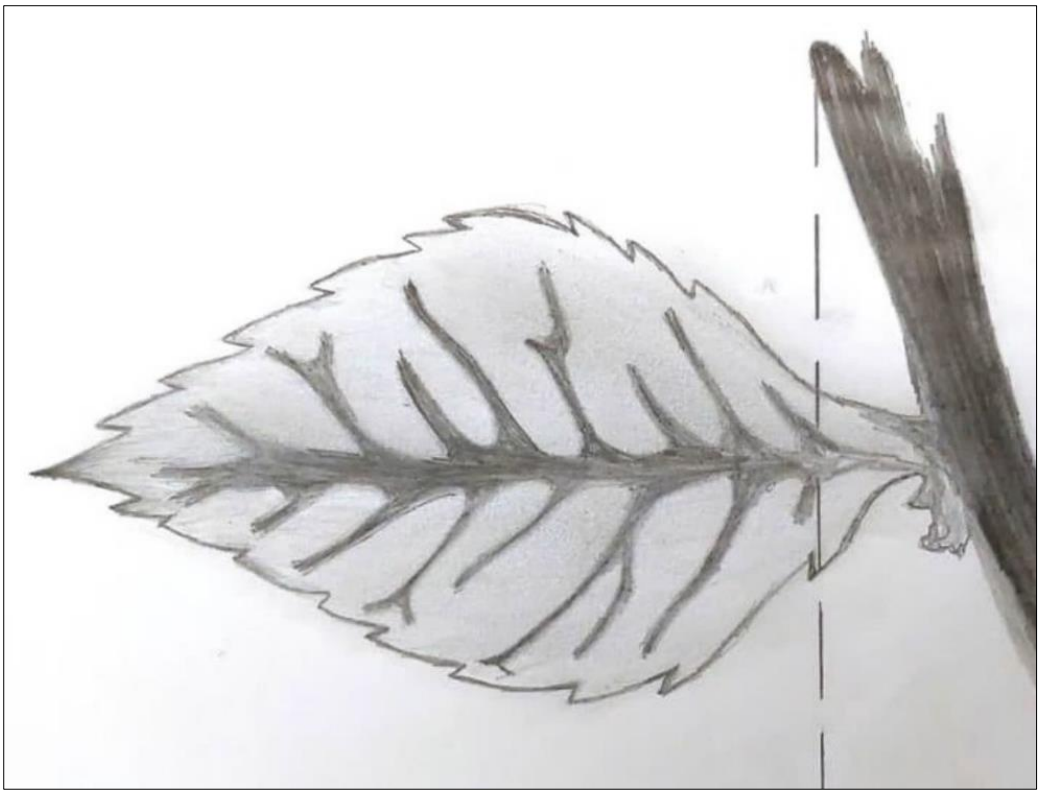

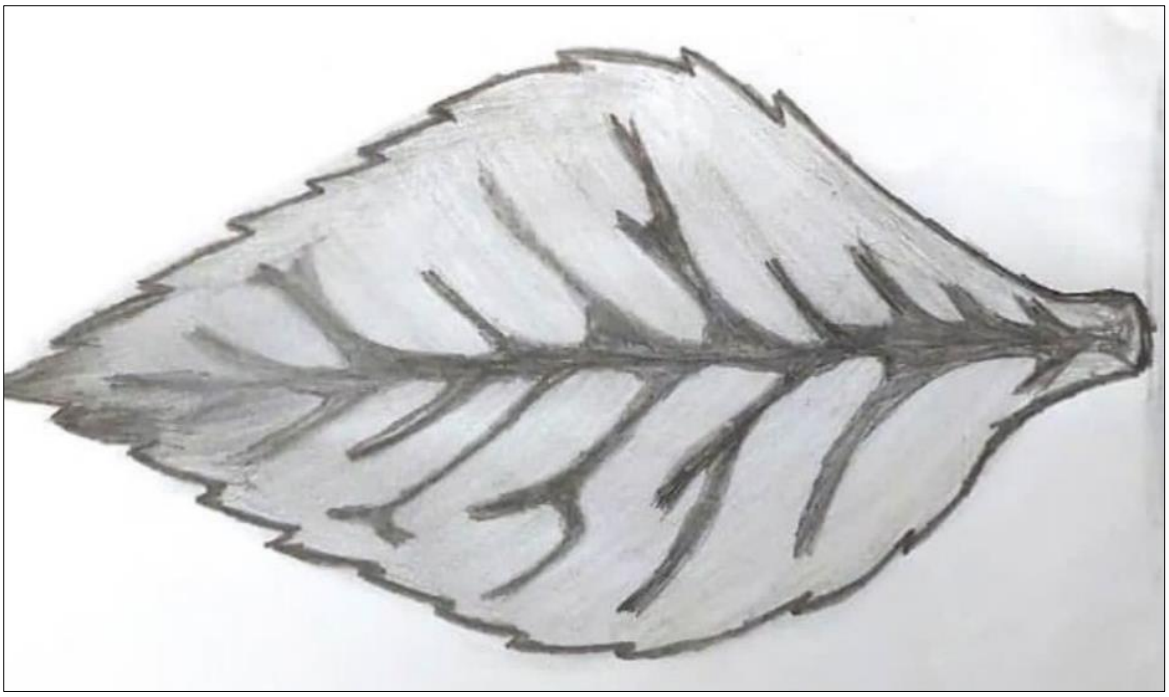

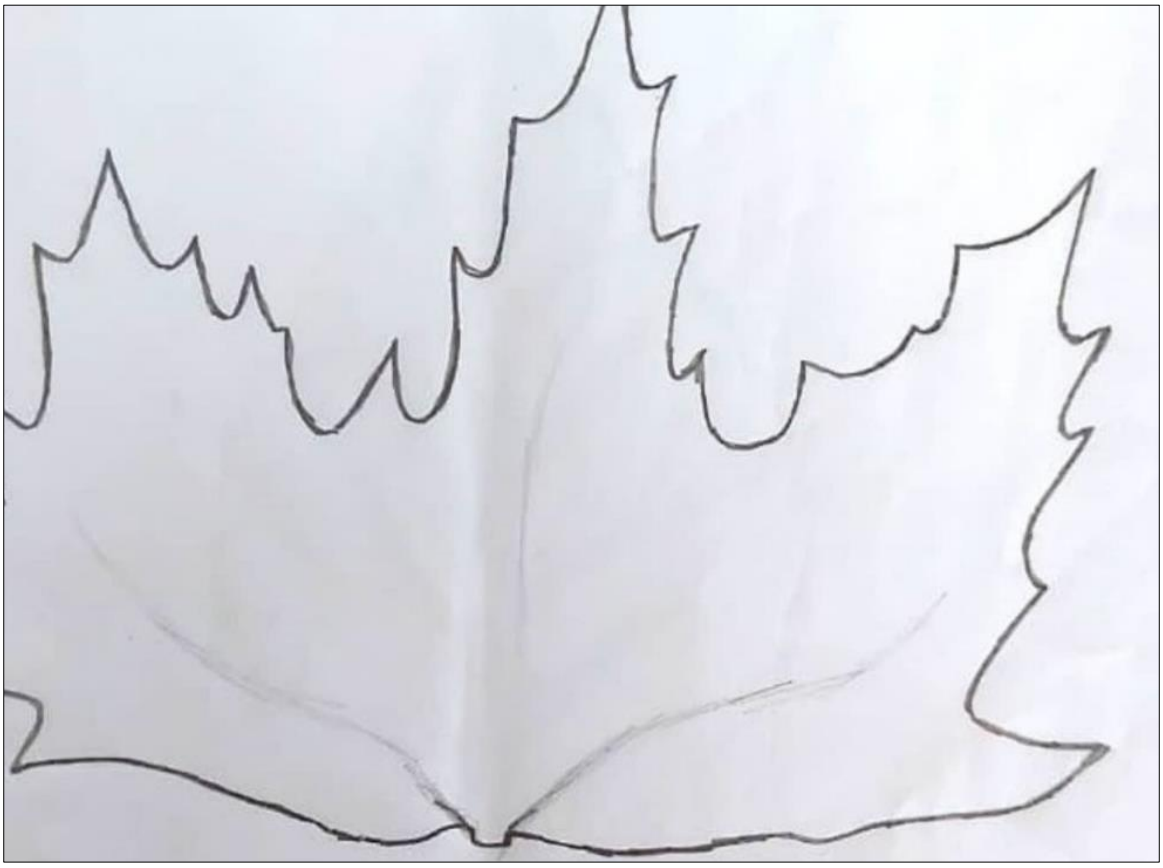

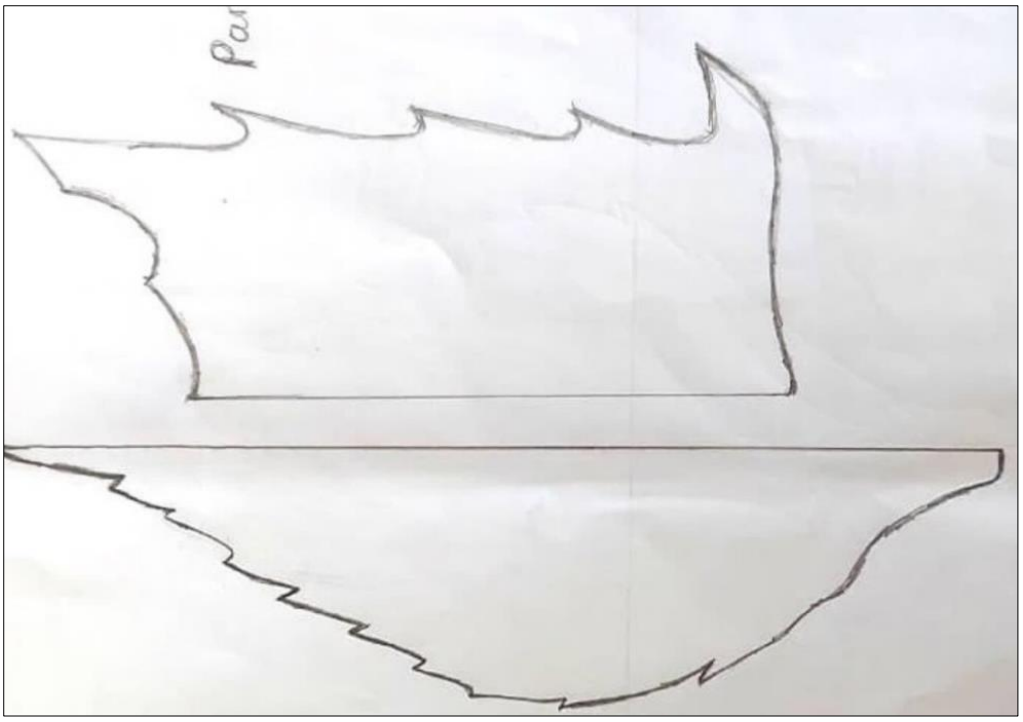

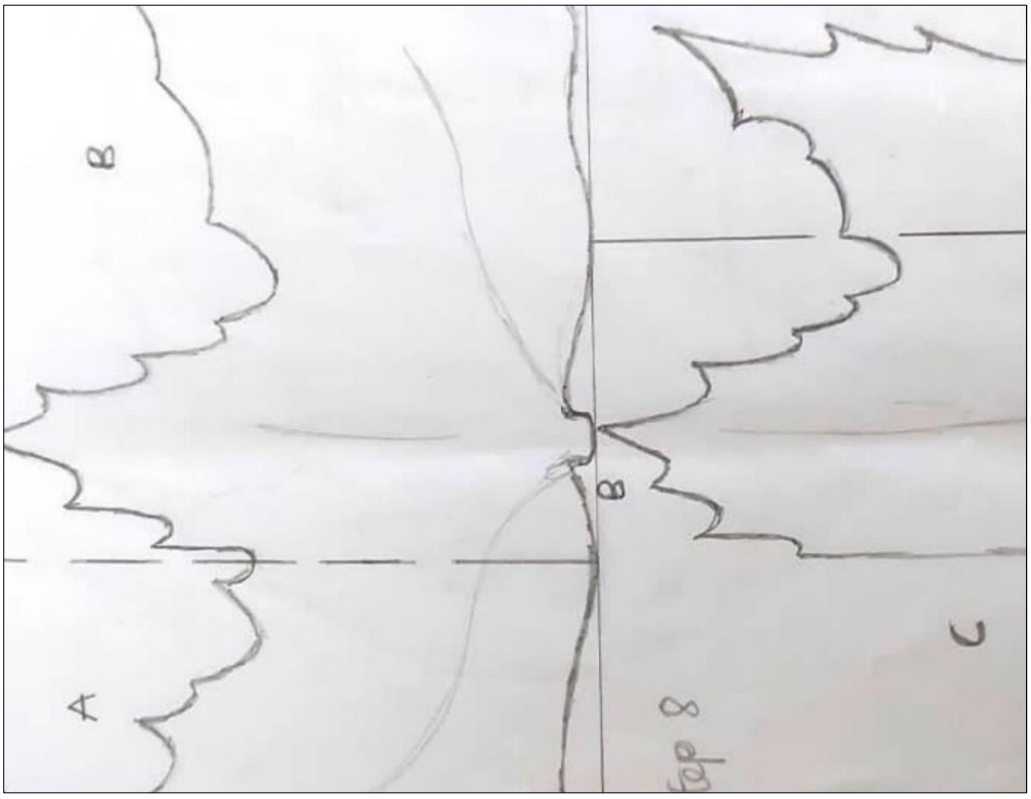
B
A
B
C