DEVELOPMENT OF A DIGITAL STORYTELLING PACKAGE AND ITS EFFECT ON STUDENTS' LEARNING OUTCOMES IN MAP READING IN IBADAN METROPOLIS, NIGERIA

BY

LUKUMAN KOLAPO, BELLO
Matric NO: 121924
B.Ed Education/Geography/Economics, M.Ed Educational Technology (Ibadan)

A Thesis in the Department of Science and Technology Education
Submitted to the Faculty of Education
in partial fulfillment of the requirements for the Degree of

DOCTOR OF PHILOSOPHY

of the

UNIVERSITY OF IBADAN

NOVEMBER, 2018

ABSTRACT

The persistent decline in students' performance in Map Reading (MR), arising from their inabilities to match learnt features with those within the environments, has become worrisome. Experts have, therefore, advocated an interactive geography classroom instruction that incorporates Local Media Contents (LMC), which connect learners with their environments. Previous studies have concentrated largely on the development of computer-based instructions with less emphasis on LMC. This study, therefore, was carried out to develop Digital Storytelling Package (DSP) using LMC and thereafter determined its effect on students' learning outcomes (achievement in and attitude to) in MR in Ibadan metropolis, Nigeria. The moderating effects of Computer Anxiety (CA) and Perceived Relevance of Map Reading (PRMR) were also examined.

The study adopted Multiple Intelligences and Situated Cognition learning theories, while the study adopted the survey and quasi-experimental design using a 3x3x3 factorial matrix. A DSP using LMC was developed and deployed in two modes [group- (GDSP) and individual-based (IDSP)]. Three public secondary schools with SS II geography students, functional computers and electricity were purposively selected within Ibadan metropolis. Participants were assigned to GDSP (242), IDSP (138) and control (126) groups. Treatment lasted 12 weeks. Instruments used were MR Achievement Test (r=0.80), MR Attitude (r=0.75), CA (r=0.78), PRMR (r=0.82) scales and instructional guides. Five sessions each of focus group discussion and in-depth interview were held with students and teachers. Data were analysed using Analysis of covariance and Bonferroni post-hoc test at 0.05 level of significance, while qualitative data were content-analysed.

Treatment had significant main effects on achievement in MR ($F_{(2, 487)}$=131.27; partial η^2=0.35) and attitude to MR ($F_{(2, 487)}$=63.30; partial η^2=0.20). Students in GDSP had the highest adjusted post-achievement mean score (18.45), followed by IDSP (17.20) and control (7.65) groups. Students in GDSP also had the highest adjusted post-attitude mean score (50.18), followed by IDSP (49.87) and control (34.63) groups. There were no significant main effects of CA and PRMR on students' achievement in and attitude to MR. There was a significant two-way interaction effect of CA and PRMR on students' attitude to MR ($F_{(4, 487)}$=2.66; partial η^2=0.02), but not on achievement. There were no significant two-way interaction effects of treatment and CA and treatment and PRMR on students' achievement in MR. There were no significant two-way interaction effects of treatment and CA and treatment and PRMR on students' attitude to MR. There was no significant three-way interaction effect of treatment, CA and PRMR on students' achievement in and attitude to MR. The LMC in the developed package aroused enthusiasm and participation among the students, while the teachers mainly lamented about the irregular electricity supply.

The group- and individual-based digital storytelling instructional packages enhanced students' achievement in and attitude to map reading in Ibadan metropolis, Nigeria; though, the former was more effective. Therefore, geography teachers should adopt this package to teach map reading regardless of computer anxiety and perceived relevance of map reading.

Keywords: Computer anxiety, Map reading in geography, Local media contents, Group- and Individual-based digital storytelling package

Word count: 477

ACKNOWLEGEMENT

All praises and appreciation belong to Almighty Allah, through whom all seemingly impossibles were made possible. I will forever remain grateful to Allah, for His mercies over me are not only uncountable but also unquantifiable. I appreciate my dear supervisor and mentor, Late Dr. Gloria Olusola Adedoja for her unflinching supports and encouragement throughout my academic pursuits. Although she is no longer with us, this thesis remains part of the legacies she left behind, as I promise to uphold her virtues of honesty, modesty and commitment to serve mankind. I appreciate Prof. Ayotola Aremu for taking that bold step to complete the supervision of this work, after the demise of my dear supervisor. I am highly indebted to my late parents; Alhaji Abdul Ganeey and Alhaja Rodiyah Bello for raising me with the absolute fear of Allah and supporting me in all spheres of my life, while they were alive. May Allah grant them Aljanah Firdaos.

My sincere gratitude goes to my dear sister, Mrs. F.F. Azeez, for taking up the responsibility of my schooling right from primary school level. I beseech Almighty Allah to grant her long life and sound health to reap the fruits of her labour. I sincerely appreciate the efforts of my siblings; Mrs. Bilquees Tella, Mr. Rasheed Bello, Mr. Busayo Azeez and Mr. Tella Ibraheem for their prayers and supports, may Allah reward them in manifolds. I would forever remain grateful to my dear wife; Mrs. Rosheedah Eniola Bello and lovely daughters; Rodiyah Ayomide Bello and Aisha Funmilola Bello, for their love, understanding and supports throughout the course of this programme.

I appreciate the efforts of my respected lecturers; Dr. A. Tella, Dr. Dara Abimbade, Dr. Tumbi Akinyemi and Dr. Israel Olasunkanmi for providing the required academic guidance towards the successful completion of this work. Lastly, I specially appreciate my colleagues, who actually made this programme an interesting and worthwhile academic exercise. This experience will linger forever. I cannot forget the likes of Busayo Fakuade, Henry Ogundolire, Emmanuel Babalola, Alhaja Hamzah Lateefah, Mrs. Toun Akinkuolie, Yemi Olalude, Oyarinde Oluremi, Mrs. Komolafe Olaide, Obideyi Ebenezer and others. I love you all.

L.K. Bello

CERTIFICATION

This is to certify that this work was carried out by Lukuman Kolapo Bello under my supervision in the Department of Science and Technology Education, Faculty of Education, University of Ibadan, Ibadan, Nigeria.

DATE

Ayotola Aremu
B.Sc (Ife), PGDE, M.Ed, Ph.D (Ibadan)
Professor of Educational Technology
Department of Science and Technology Education, University of Ibadan, Ibadan, Nigeria

DEDICATION

This work is dedicated to the Glory of Almighty Allah through whom all seemingly obstacles were turned to possibilities.

TABLE OF CONTENTS **PAGES**

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE
INTRODUCTION

1.1 Background to the study

Geography is simply the field of study that is concerned with how geographical occurrences are spatially organised and the consequences of human actions and interactions on the landscape. In the recent times, different areas of disciplines are increasingly dependent on geography to solve societal problems and predict outcomes of interaction between humans and the environment. Geography helps people interpret a dynamically changing world, as it gives detailed explanation on location of places on the earth, how geographical features are formed and how individuals interact with their environment. In other words, geography equips individuals with knowledge and skills to understand the implications of human actions on the environment. Functional geography education refers to the systematic application of geographical knowledge to problem solving efforts in the community. The discipline, therefore, remains strategic to ensure human beings function effectively and contribute immensely to the growth and development of the general society.

Harm (2009) asserts that if education at any level does not include geography in its curriculum, it would lead to denial of students the timely awareness of spatial interactions; deprivation of early exposure to map activities; and engenders a geographic illiteracy that could affect their performance later in life. The acquisition of professional skills and knowledge in geography equips an individual for self-reliance and to become a better citizen that contributes to the overall development of the society. The purpose of geography is well articulated in the National Policy on Education and includes the acquisition of appropriate competences and knowledge required by people to contribute effectively to the overall advancement of the country, Federal Republic of Nigeria (2014).

In Nigeria, at the senior secondary school level, geography curriculum consists of regional, human, physical geography and map reading. These subdivisions are interconnected. Physical geography deals with the natural landforms while human and regional geography address issues which directly relate to human activities on the surface of the earth (Amosun and Oderinde, 2004). Map reading on the other hand, deals with the representation of features on sheet of paper and analysis of selected geographical information which could be physical, human or regional. This implies that map reading connects all other components of geography and acquiring skills in

interpreting map could form a basis for effective and functional geography education at all levels of education. It should be mentioned that map reading is unique and strategic to the study of other components of geography. Sarah (2001) concludes that maps are not the whole of geography, but the objectives of functional geography education could not be realised without maps. In the same vein, Ofomata (2006) states that maps, of different kinds, facilitate the achievement of objectives of geography, as the maps remain distinctive tools of the geographers to locate places across the globe.

The knowledge, skills and competencies acquired in map reading activities stimulate effective learning of other aspects of geography and could also be extended to different areas of specialisation. In other words, geographers across the world often define geography around maps and map reading activities. Also, it is usually with maps that spatial relations can best be observed, analysed and interpreted, as maps enrich the study of Global Positioning System (GPS) and Geographical Information System (GIS) which are the 21st Century directional tools that influence human activities in this modern world, Wigglesworth (2003). Geographers usually employ the use of different types of maps among which are sketch map, atlas map and topographical map. Topographical map is a fundamental instrument in map reading exercise. It depicts the specifics of landforms in a geographical environment using map symbols on a large sheet of paper, Egunjobi (2002). The process of reading topographical map provides the basic skill that could be deployed in developing a diverse range of knowledge in other areas of geography and some social science subjects.

However, the teachers' inability to engage students in map reading activities and relate features on the map to geographical landforms in the community has been a great challenge to effective geography education in senior secondary schools and weakened the morale and enthusiasm of geography students. This has resulted in increased poor performance in map reading in Senior Secondary School Certificate Examinations for some years now. The West Africa Examination Council (WAEC) chief examiners reports (2005 - 2016) consistently showed that candidates poorly attended questions on map reading aspect of geography in the examinations. The reports particularly centered on the inability of geography students to identify different features on the topographical map. Many students seem not to understand that the features they learn in physical geography are represented on the topographical map. For instance, the 2007 report showed that many candidates found it difficult to

identify the required physical landforms on the topographical map. Also, it was reported in 2014 that many questions on map reading were left unattended to by candidates, as most of them showed that they were not capable of identifying physical and natural landforms on the topographical map, using contour lines and other map symbols. It would be observed that many students find it difficult to identify features that are represented on the topographical map and by extension, some of the students might not even understand that the features on the maps are the reliefs in their local communities. In other words, there seems to be a disconnect between what students learn in map reading classes and the real features in their local environments. It should be mentioned that one of the main objectives of teaching map reading at this level is to allow students identify different features on the topographical map and be able to relate them to the geographical landforms in the society.

In Nigeria, studies have shown that most geography teachers usually employ conventional method to teach map reading, by using verbal presentation of instructional content, where the teacher usually dominates the teaching-learning process that is usually devoid of learners' active participation. In some cases, geography teachers teach map reading in the classroom by drawing the features on the chalkboard and this makes the concept so abstract and far from students' experience. This is what Egunjobi (2007) terms 'talk and chalk method' in teaching map reading where geography teacher mainly presents the topic, while the students are made to passively listen to instructional content in the classroom. This approach does not engage learners in map reading activities and could hinder the realisation of the objectives of teaching map reading in secondary schools.

Researchers across the globe have conducted series of studies on the factors responsible for student's poor attitude and academic achievement in geography and map reading at the secondary school level. Egunjobi (2002); (Sofowora and Agbedokun, 2010) observe that the study of geography from its beginning has been generally through verbal explanation of geographical phenomena, which has resulted to poor interest and attitude in the discipline. It had been reported that, many students consider geography as part of the most challenging disciplines in the curriculum and map reading as the most difficult aspect of geography to learn (Amosun (2002); Falode (2014); Muhammed, (2014)). Different reasons had been identified as responsible for this problem which include; the nature of geography and the delivery approach adopted by teacher in disseminating the content to students in the classroom.

It is believed that this important school subject is usually being presented to the students in a way that does not encourage questioning, critical thinking, problem solving and meaningful engagement in the classroom. This has resulted in the dearth of young scholars in the discipline due to the boring and uneventful approach being adopted by many teachers (Sofowora and Agbedokun, 2010).

Apparently, geography teachers need to improve on the teaching strategy in map reading classes to ensure that students are engaged in instructional content and this could lead to better students' learning outcomes. This challenge is well encapsulated in the assertion of Amosun (2016) that secondary school teachers are consistently using teacher-centred method which has not resulted to positive outcomes and for map reading activities to become functional and productive, it is imperative for teachers to change their methodologies and incorporate more student-centered approach to classroom activities. Map reading is an applicative concept and teachers need to strengthen the relationship between classroom activities and learners' experience outside school setting.

Therefore, there is a need to demystify map reading by making it interesting, engaging, friendly and applicable to real life situation. It should be noted that teachers, in every subject, are rapidly taking advantage of the affordances provided by digital devices to overcome the challenge of abstractness, with a view to engaging students in classroom activities. Geography, as an important school subject, cannot be left out of this revolution. Educators are adopting and integrating technological devices to instructional delivery process, with a view to addressing the inherent shortcomings in conventional method of teaching. Scholars like Sofowora and Agbedokun (2010), Falode (2014) have advocated the need for geography teachers to integrate technological tools into their repertoire of teaching-learning toolkits, with a view to demystifying map reading and make it connected to real life situation. Obondo, Nabwire and Jaction (2013), reveal that the prevalent students' poor performance in map reading is due to the wrong impression about different concepts in map reading and instructional delivery approach employed by the teachers in the classroom. They submit that, conventional method which is widely used should be enriched with modern innovations and ICT-based strategies to reduce the level of difficulty in teaching of map reading and conform to expected global standard. Consequently, Falode (2014) suggests that students' attitude to geography and map reading in particular could be positively altered with the use of student-centered

strategy that incorporates computer related technologies with local media content to instructional delivery.

Thus, at this point, it is important to ask some critical questions about which types of technological tools or instructional strategies could help geography teachers overcome these challenges and which technological tools have the capabilities to solve the problems in map reading instruction as identified in the background to this study. Different technological tools like simulation, digital games and puzzles and other interactive packages had been used to facilitate map reading activities in the classroom, with positive outcomes in terms of students' academic performance. For instance, Egunjobi (2007) used the tutorial mode of CAI while Falode (2014) developed simulation package to teach map reading at the senior secondary school level. These efforts by scholars revealed positive outcomes in terms of students' academic performance in map reading.

However, the effective teaching and learning of map reading transcends students scoring high marks in examination. Geography students need to develop the capabilities to appreciate the interactions that exist between physical geography and map reading and also understand the connection between map reading activities and geographical landforms in the community. Therefore, there is a need for an instructional strategy that would make map reading activities more realistic to students. In other words, there should be a shift in the focus of conventional method of teaching map reading to incorporate technological tools that would engage students in classroom activities. This affords them the opportunities to acquire skills and knowledge to relate features on the topographical map to the landforms in their environments.

Emerging tools like digital puzzles, digital games, mobile phones among others could be used by teachers to engage students in instructional content. One of the emerging technologies that could be employed by geography teachers to surmount the challenges that hinder map reading instruction is digital storytelling (DST). This could be defined as a strategy that combines the power of storytelling and the capabilities of media to effectively engage learners in teaching-learning process. In the entire history of human race, storytelling has been employed as an effective instrument for the exchange of ideas, norms and values among people in the society. The use of storytelling as the basic form of knowledge transfer remains very powerful and has proven to be enduring over many centuries and across different cultures. The

classroom application of storytelling is also not new as many teachers use it to impart knowledge to the students at different times. Behmer (2005) believes that storytelling allows students to personalise the content and make meaning out of the stories they listen to. In other words, storytelling allows the incorporation of culturally relevant local contents into instructional process, to make learning more realistic and connected to learners' environments. It should be noted that there is a limit to which traditional storytelling could be used to reduce the level of abstractness in teaching-learning process. Although storytelling arouses students' interest to pay attention to the details of the class activities, learners still need the support of visual display of instructional content, in order to make learning more connected to real-life situation. The major limitation of traditional storytelling is its inability to present visual display of the story content to the audience. Students are left to imagine how the visual component of the story would look like. This makes traditional storytelling to seem inappropriate to actively engage 21st Century learners, who live in media saturated environments.

In the recent times, a new version of storytelling is emerging and it is known as digital storytelling. Digital storytelling provides an appropriate convergent platform for traditional storytelling and technology to effectively interact and facilitate classroom activities. Meadows (2003) defines digital storytelling as a strategy that makes use of computer-related software and other technologies to undertake storytelling activity. Robin and Pierson (2005) emphasise that DST works on the resourcefulness of stakeholders in education to create stories that could simplify instructional content and ease classroom activities. Students in digital storytelling supported classroom are regarded as participatory and active learners who can interact with the story and synthesise information from the instructional content. The fundamental limitation of traditional storytelling could be corrected with the effective integration of media resources into teaching-learning process, through digital storytelling.

UNESCO considers digital storytelling as one of the elements which could be deployed by classroom teachers to equip students in this modern world with professional skills. This is in line with the objective of Education for Sustainable Development UNESCO (2010). This organisation considers digital storytelling as a key enabler for realising the main objectives of education for sustainable futures. It should be mentioned that DST and instructional content are inextricably linked

because the process of writing script in digital storytelling is fundamentally a meaning-making process, where students could be asked to reflect on a particular topic, search for appropriate materials, select digital tools to use and finally record their stories. Thus integrating digital storytelling into classroom instruction strengthens students' learning process. It provides a record of students' level of thinking and creativity and teachers could easily deploy this strategy in assessing student progress toward learning objectives. Digital Storytelling had been touted as an instructional tool that allows students and teachers interact directly with the technology and makes learning more realistic and connected to real-life situation (Adedoja and Bello, 2016). Therefore, it is increasingly forming part of our national lives, and it is at the threshold of becoming an indispensable companion in instructional delivery process. In essence, digital storytelling is a positive response to the technological revolution in education sector across the world.

Based on these unprecedented instructional benefits that are derivable from using digital storytelling for classroom instruction, it is important that geography teachers take full advantage of these affordances to facilitate map reading activities in the classroom. In this part of the world, digital storytelling had not been embraced to teach the concept of map reading at the senior secondary school level. Using digital storytelling for classroom instruction could afford geography teachers the opportunities to surmount some of the obstacles that hinder map reading activities in schools. One of the problems with the conventional method of teaching map reading is that this strategic aspect of geography is usually being presented in abstract form. Studies like Robin (2008), (Smeda, Dakich and Sharda, 2010) affirm that digital storytelling reduces the level of abstractness in instructional process and geography teacher could leverage the capabilities of digital storytelling to surmount this kind of challenge. The power of media in digital storytelling reduces the level of abstractness associated with the map reading instruction in the classroom.

Falode (2014) asserts that the level of engagement in many conventional map reading classrooms is quite low as students do not actively participate in classroom activities. Classroom teachers who use digital stories would discover that this learning tool could help in stimulating deep learning and also make difficult concepts more understandable to the students (Robin, 2008). Engaging learners in class activities could substantially solve part of the problems hindering effective teaching of map reading at the secondary school level. Also, to ensure active engagement with the

instructional content, the digital storytelling package used for this study contained learning activities that learners needed to carry out while watching the content. Within the story content, students were made to respond to some class activities to progressively monitor their learning as they listen to the stories. This engendered active engagement of students in the instructional content.

In the same vein, since stories in the package were created using pictures and short videos from learners' environment (Local Media Content), geography students could be well positioned to relate features on the topographical map to the geographical phenomena in their areas. This is considered a process of adding 'local media content (LMC)' into digital storytelling. When students watch story that tells them how a secondary school boy visited landforms in the village to find out the features that had been taught in the map reading classroom, it gives a message that features on the topographical map are within students' immediate environment. In essence, using digital storytelling could help in facilitating the realisation of the objectives of teaching map reading in secondary schools. These are the capabilities that digital storytelling could offer in solving problems confronting map reading instructions in Nigerian schools. Geography teachers could use group-based and individual-based digital storytelling to engage learners in instructional process. Sadik (2008) asserts that digital storytelling provides opportunities for teacher to organise both group-based and individual-based learning activities to suit the learning styles of diverse learners in the classroom. In other words, group-based digital storytelling promotes collaboration and teamwork among students while individual-based digital storytelling allows students to study at their own pace.

This kind of intervention would go a long way in improving learners' attitude towards the concept of map reading. Students' attitude plays strategic role in effective technology integration and learning outcomes. Huang and Liaw (2005) assert that the successful implementation of any technology-based instruction depends largely on the attitudinal disposition of participants involved in the exercise. For instance, if teachers believe that a planned technology-based task could neither ease instructional delivery nor fulfill students' needs, they might not be willing to use such technological device in classroom instruction. The disposition of teachers goes a long way in determining whether a particular technology would be adopted for instruction or not. Groff and Mouza (2008) reiterate that students' attitudes and beliefs are critical factors in determining students' decision to participate in classroom activities. In other words,

the attitude of students to a particular subject defines their participation and level of achievement in such area of study.

Digital storytelling combines traditional art of storytelling with modern technological devices and the end product is a sophisticated instructional tool that engages students in teaching-learning process. However, some factors had been identified as critical parameters that could determine the adoption and integration of technology at all levels of education. These factors include technology anxiety, technology familiarity, computer self-efficacy, computer anxiety, perceived relevance, interest, computer literacy and gender among others. As the use of technological tools pervades every aspect of human endeavours, computer anxiety could play pivotal roles in instructional delivery at different levels of education. The teaching and learning of map reading could also be affected by the perception of geography students of the relevance of this concept in solving their immediate and future challenges. Variable like computer literacy or digital literacy could not be used for this study because this package was deployed, such that students who are not competent computer users could easily use it for instruction. In other words, students only need to click on the story and watch the instructional content. However, students could experience some level of fear or anxiety while interacting with computers and therefore, computer anxiety was selected as one of the moderator variables in the study. Thus, the moderator variables for this study were computer anxiety and perceived relevance due to their strategic roles in teaching-learning process.

Studies like (Agarwal and Karahanna, 2000), (Raafat and Dennis, 2007) and others have examined the influence of computer anxiety on students' learning outcomes and the results emphasised the strategic position this factor occupies in instructional process. Computer anxiety is an important factor in any classroom setting. Every student, whether participating in computer related activity or not, has some level of computer anxiety. The classroom environment is rapidly becoming technology-based and students are generally confronted with the challenges of using digital tools for classroom activities at different levels. Therefore, computer anxiety becomes an important factor for todays' learners, whether participating in computer-based learning or the conventional teaching strategy. Fear of failure, computer anxiety and inadequate knowledge of ICT have been identified as critical determinants of teachers' readiness to use technology to engage learners in teaching-learning process, (Balanskat, Blamire and Kafal, 2007). Raafat and Dennis (2009) affirm that the use of

technological devices could occasionally be followed with unfriendly results, including negative emotional states, like anxiety and fear among the participants in the instructional process. They carried out a study to determine impact of computer anxiety on students' readiness to use online platform for learning. The findings show that computer anxiety significantly influenced students' readiness to use LMS for learning purpose.

However, (Saadé and Bahli, 2005) found out that computer anxiety had no significant influence on prospective teachers' readiness to participate in technology course at the university level of education. It should be mentioned that digital storytelling is a computer related activity and students' computer anxiety could affect their participation in classroom activities. Even students who were not exposed to this strategy could also be confronted with the issue of computer anxiety anytime there is a need to participate in computer related activities. According to (Raafat and Dennis, 2009), whether students are presently participating in computer related activities or not, computer anxiety would always be a challenge due to differences in students' technological background and competence in using technology for classroom activities.

In the same vein, students' perceived relevance had been identified as a critical factor that influences students' attitude to a particular subject at any level of education. Perception can simply be defined as an act of recognising something or event based on the existing knowledge, which could positively or negatively influence attitude towards a task. Cashin and Downey (2000) found that students' perception of any subject positively correlates with their attitude towards the course. Students would display positive attitude to a course of study, if they perceive it as being relevant to solve their problems now and in the nearest future. Students' positive perception of any subject could go a long way in determining their level of achievement and how they would deploy their experience in that course in the future life. Students with low or no positive perceived relevance about a subject would experience difficulty in achieving success in the course (Mukesh and Sarita, 2015). It is imperative to note that one of the critical factors affecting geography is the negative perception of geography as a difficult subject to understand. Many of these students seem not to understand how their experience in geography or map reading classes could help them relate positively with their environments. This affects their perceived relevance of map reading to solve their problems, now and in the future. Osborne,

Simmon and Collins (2003) assert that the attitude of students to science-related subjects is fundamentally a consideration of perceived relevance, and without this critical component, teacher's effort at maintaining students' interest and active participation in classroom activities becomes exercise in futility. There seems to be a strong nexus between perceived relevance and students' ability to make connections between a particular subject content and daily activities in the environment, Coker (2009).

In conclusion, digital storytelling complements the power of conventional storytelling and geography teachers could leverage the capabilities of this strategy to make map reading more interesting and culturally relevant to the students. This strategy could aid the realisation of the objectives of teaching map reading. In view of all these, the study was, therefore, carried out to develop digital storytelling package and determined its effects on students' learning outcomes in map reading in Ibadan metropolis, Nigeria.

1.2 Statement of the problem

Map reading remains strategic to the study of geography, as it involves interpretation of the interactions between man and the environment. The persistent poor performance of senior secondary school students in map reading over the years has become a worrisome issue, with experts consistently advocating for a need to complement geography classroom instruction with tools that could engage learners in active teaching-learning process. In an attempt to confront these challenges, scholars had utilised different modes of computer-based instructions like simulation, digital games and puzzles among others to improve academic performance of geography students in map reading. Many of these interventions usually focused on the improvement in the academic achievement of students after classroom instructions.

However, there is more to map reading activities than improved performance in terms of good grades. Students need to be engaged in map reading activities in the classroom. They should develop positive attitude towards map reading and acquire relevant knowledge to appropriately relate features on the topographical map to the landforms in their immediate environment. These are the challenges that could be surmounted with the systematic adoption of digital storytelling in instructional delivery. In addition to improving students' performance in terms of good grades, digital storytelling could facilitate the process of understanding the relationship between map reading activities in the classroom and the geographical landforms in the

local community. Also, in this part of the world, there seems to be a paucity of study in the area of using digital storytelling to facilitate map reading instruction in the classroom. This study was, therefore, carried out to develop a DST package and determined its effects on students' learning outcomes in map reading in Ibadan metropolis, Nigeria. Lastly, the moderating effects of computer anxiety and perceived relevance were considered in the study.

1.3 Research questions

Three research questions were raised and qualitative data was generated through focus group discussion from geography students and in-depth interview from geography teachers. These research questions are:

1. What are the benefits derivable from using digital storytelling for classroom instruction?
2. What are the major hindrances confronting geography teachers and students in using digital storytelling for classroom instruction?
3. Do geography teachers and students embrace digital storytelling to support classroom instruction?

1.4 Hypotheses

Seven null hypotheses were tested at 0.05 level of significance, as follows:

H_{O1}. There is no significant main effect of treatment on senior secondary school II geography students'

a. academic achievement in map reading
b. attitude to map reading.

H_{O2}. There is no significant main effect of computer anxiety on senior secondary school II geography students'

a. academic achievement in map reading
b. attitude to map reading.

H_{O3}. There is no significant main effect of perceived relevance of map reading on senior secondary school II geography students'

a. academic achievement in map reading
b. attitude to map reading.

H_{O4}. There is no significant interaction effect of treatment and computer anxiety on senior secondary school II geography students'

a. academic achievement in map reading
b. attitude to map reading.

H_{O5}. There is no significant interaction effect of tr///eatment and perceived relevance of map reading on senior secondary school II geography students'

a. academic achievement in map reading

b. attitude to map reading.

H_{O6}. There is no significant interaction effect of computer anxiety and perceived relevance of map reading on senior secondary school II geography students'

a. academic achievement in map reading

b. attitude to map reading.

H_{O7}. There is no significant interaction effect of treatment, computer anxiety and perceived relevance of map reading on senior secondary school II geography students'

a. academic achievement in map reading

b. attitude to map reading.

1.5 Significance of the study

This study could improve geography students' achievement and attitude to map reading activities in the classroom. The study provides a veritable platform to enrich geography students with abilities to connect features on the map to the landforms in their environments through the power of storytelling and the capabilities of appropriate media. This could make learning to be more realistic and connected to real life situation. It also provides an intervention that could demystify teaching and learning of map reading and thus promotes students engagement with map reading activities. Also, this study could provide a suitable platform for the educational policy makers to integrate appropriate technological tools into the geography curriculum that could arouse students' interest and facilitate classroom instruction. Finally, the findings from the study provide an empirical data on how the effective utilisation of DST strategy and the influence of other moderator variables like computer anxiety and perceived relevance could improve students' attitude and performance in this critical component of geography.

1.6 Scope of the study

This study examined the development of DST instructional package and its impacts on students' attitude to and achievement in map reading in Ibadan metropolis, Nigeria. Three senior secondary schools that offer geography were selected to participate in the study within Ibadan metropolis, Oyo State. The study covered six

difficult topics in map reading that were identified during the conduct of the baseline study. The topics are:

(i) Identification of features on topographical map (Valley)

(ii) Identification of features on topographical map (Spur)

(iii) Identification of features on topographical map (Ridges)

(iv) Methods of representing relief on topographical map (Contour)

(v) Representation of river and its direction of flow

(vi) Intervisibility

Senior secondary school II students of geography were used for this study since they have been exposed to some concepts in map reading and they were not preparing for any terminal examinations. Computer anxiety and perceived relevance of map reading were selected as moderator variables to examine their moderating effects on the learning outcomes. Also, achievement in map reading and attitude to map reading were the learning outcomes in the study.

Study Area

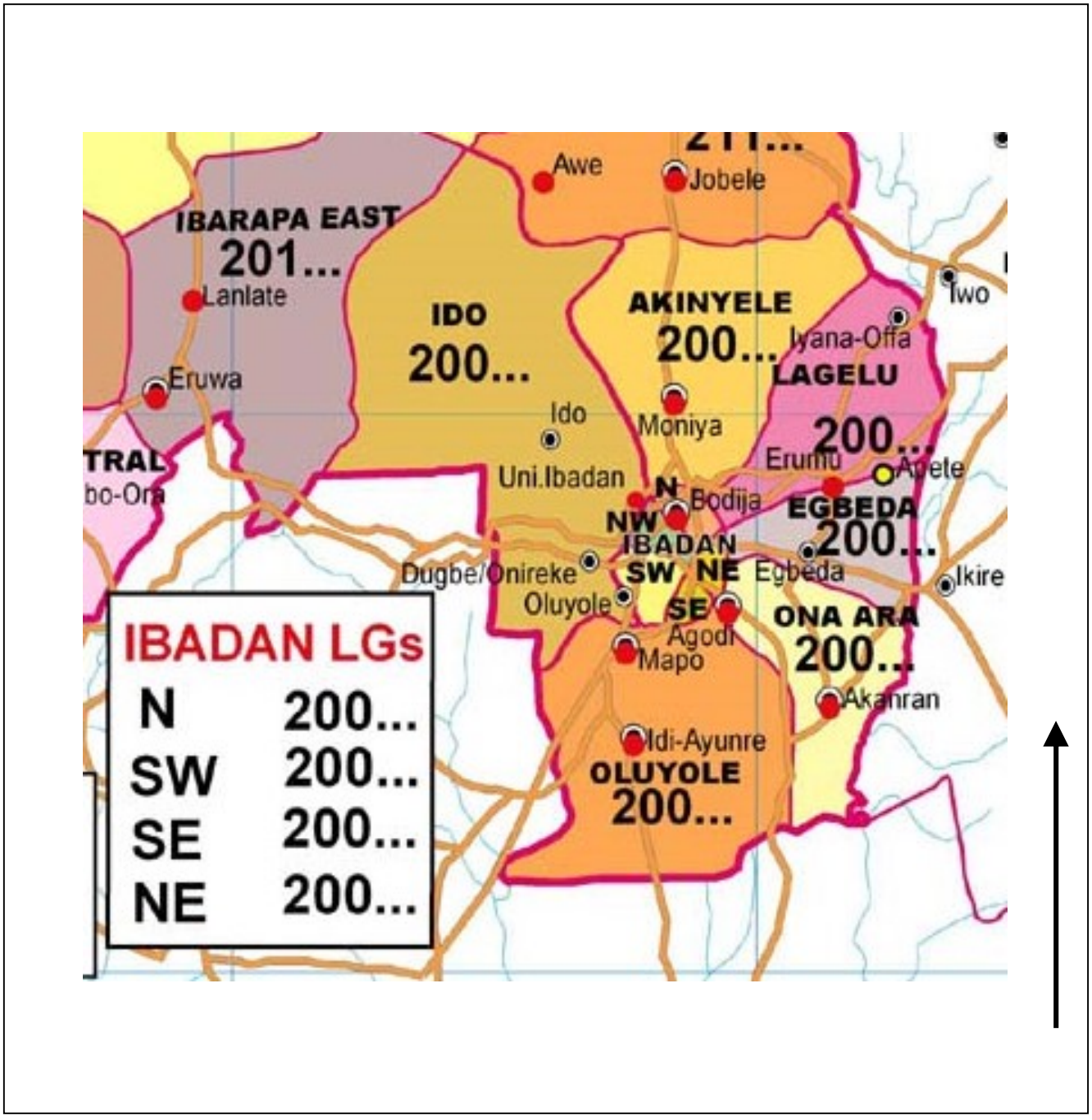


Figure 1.1. The map of Ibadan metropolis

Ibadan is the capital of Oyo state in south-west part of Nigeria. It has a population of over 3 million people and the most populous city in the state. Its geographic coordinates are Latitude: 7°22′39″ N Longitude: 3°54′21″ E. This study area was selected because schools with facilities like computers and alternative power supply were required at the implementation stage. Schools with these kind of facilities could easily be found within Ibadan metropolis and this informed the decision to cover this geographical scope in the study.

1.7 Operational definition of terms

Students' Achievement in Map Reading: This is the performance of senior secondary school II geography students in map reading test, after they were taught using digital storytelling package as measured by the Achievement Test in Map Reading (ATMR).

Students' Attitude to Map Reading: It is the disposition of senior secondary school II students to participate in map reading classroom activities as measured by Questionnaire on Students' Attitude towards Map Reading (QSAMR).

Computer Anxiety: This is the fear entertained by senior secondary school II geography students when confronted with computer related activities, especially learning 14 map reading with digital story package as measured by Computer Anxiety Questionnaire (CAQ).

Digital Storytelling: It is the process of utilising digital tool to create educational stories around different concepts in map reading, which could be used by students in Nigerian secondary schools.

Group-Based Digital Storytelling: This is a digital storytelling mode where senior secondary school II geography students were allowed to view digital storytelling package in groups in map reading classroom.

Individualised Digital Storytelling: In this mode, individual geography student viewed the digital storytelling package during the break time or after school hour with school computers before the class.

Students' Learning Outcomes: These include senior secondary school II geography students' attitude to and achievement in map reading.

Map reading: This is an aspect of geography that deals with interpretation of signs and symbols on the topographical map in senior secondary school.

Perceived Relevance of Map Reading: This refers to the way geography students view map reading as an important component of geography that could help them

understand their environments as measured by Questionnaire on Students' Perceived Relevance of Map Reading (QSPRMR).

Digital Storytelling Package: This is an instructional package that presents map reading content in form of story, to teach senior secondary school II students.

CHAPTER TWO

LITERATURE REVIEW

This chapter was reviewed under four sub-headings which are theoretical framework, conceptual review, empirical review and appraisal of the literature.

2.1 Theoretical Framework

2.1.1 Multiple Intelligences Theory

This learning theory was postulated by Howard Gardner in 1983 and he asserts that human intelligence consists of the capabilities of individuals within a society to solve problems and provide essential services that are cherished in the community. He postulated that every individual enjoys nine forms of intelligences and these shape the pattern of interaction across the globe. He initially proposed eight intelligences and later added existential as the ninth intelligence possessed by the learners in the classroom. He carried out his research on individuals who were suffering from stroke and autism. With his new focus in learning theory, Gardner has been able to change the long held traditional beliefs in cognitive science and the field of education.

These are the key assumptions of his theory of intelligences:

(i) The first to note by teachers is that all students possess these nine intelligences in different degrees. Each student in the classroom has a unique intelligence profile to help in decision-making.

(ii) Education stakeholders can improve instructional activities by proper investigation of the intelligence profiles of different students in the classroom and designing learning activities that could effectively suit their learning needs.

(iii) Each intelligence has a specific space it occupies in human brain.

(iv) These human intelligences could function either jointly or autonomously.

(v) Lastly, he believes that these multiple intelligences could shape human interaction in the society.

For teachers and other education stakeholders to properly integrate these intelligences into classroom practices, there is a strong need to change our impression about teaching and learning procedures to cater for students' individual differences and provide a wide range of activities to facilitate instructional delivery at all levels of education. Gardner's theory has been able to articulate teachers' belief that students in the classroom possess varying strengths and weaknesses and provide direction on the way to facilitate a student's ability in any form of intelligence. It is important that

teachers begin to look at lesson planning and implementation from the perspective of meeting the diverse intelligences and learning styles of students in the instructional process, Michael (2010). Gadner identifies the following intelligences as what distinguish different learners in the classroom:

Verbal/Linguistic intelligence: this type of intelligence incorporates student's abilities to utilise words in exchanging ideas with other members of the society. Averagely, it is believed that almost every member of the community has this form of intelligence, although it could occur at different levels. This consists of communication skills like reading, writing, listening and speaking. The onus lies on teachers to assist students in developing this level of intelligence by using appropriate media content and encouraging students to read journals and textbooks.

Logical/Mathematical intelligence: in this form of intelligence, the focus is on an individual's capability to collect, analyse and interpret data for effective decision-making process. Classroom teachers can support this intelligence by encouraging critical-thinking activities and linear outlining amongst students.

Visual/Spatial intelligence: people who have capabilities in this kind of intelligence utilise visual thinking and are usually very creative in different operations. In other words, individuals with strength in this type of ability learn easily from visual presentations like pictures, videos as well as classroom demonstrations with models and props. Teachers can foster this type of intelligence by using multi-media representations to engage students in classroom activities.

Bodily/Kinesthetic intelligence: this type of intelligence focuses on individuals who have the ability to interpret information through body sensations. These people prefer to change location more often, demonstrate things by touching people as they talk and interact within the society.

Naturalistic intelligence: individuals with this intelligence possess the ability to classify plants, animals and other components of the society. Teachers can encourage students to study the relationships, connections between components such as patterns and hierarchy, and also distinguish sets of groups in real life situations.

Musical intelligence: this intelligence incorporates individual's competence to decode rhythm and compose music of different types. Classroom instructors can develop this level of intelligence by integrating activities like playing music for the class, use soundtrack in developing instructional package and giving tasks that require

students producing lyrics or listening to soundtracks that convey instructional messages.

Interpersonal intelligence: in this type of intelligence, the focus is on the ability of people in the society to react to emotions and motivations from other people. It requires good communication and interaction skills. Teachers can encourage this intelligence by using instructional strategies that promote collaboration and teamwork.

Intrapersonal intelligence: in simpler term, intrapersonal intelligence is process of understanding oneself from within. This is usually considered as an internalised form of interpersonal intelligence and it allows individuals to be able to appreciate their personal emotions, strengths and weaknesses. This intelligence involves the use of all other intelligences in human intelligence profile.

Existential intelligence as the ninth intelligence that has not been fully accepted by educators for classroom instruction. It encompasses the ability to reflect on questions that have to do with existence, including life and death.

Table 2.1**.** Multiple intelligences enhanced by digital storytelling activities

Multiple Intelligences	Digital Storytelling Activities
Verbal/Linguistic	Senior secondary school geography students listen to the content of the story and read text that accompanies the pictures. This develops their reading and listening skills.
Logical/Mathematical	Students need to logically interpret the content of digital storytelling package and make meaning out of it. Digital storytelling is a meaning-making process and it sharpens geography students' inductive and deductive reasoning skills.
Visual/Spatial	Visual representations like pictures and videos that accompany digital storytelling package promote visual and spatial intelligence of the students in the classroom. Students are able to connect abstract concept like map reading to real life experience with appropriate visual representations in digital storytelling.
Bodily/Kinesthetic	During collaboration and teamwork, students process and interpret information with emotion and sensation and they involve in bodily contact with different materials and members of the group.
Naturalistic	Storytelling is quintessentially a natural experience and by extension, digital storytelling promotes holistic thinking ability of the students in the classroom. Students, listening to story, would have to think deeply about it and make meaning out of the content.
Musical	Voice remains a critical component of a digital storytelling package. Soundtracks are also used to arouse students' interests and motivate them to give attention to the details of the instruction. Therefore, students listening to digital storytelling package have the opportunity to learn instructional content with rhythm and tones.
Interpersonal	Geography students interact within the group to make meaning out of the story. These activities foster teamwork and promote interpersonal intelligence among the students.
Intrapersonal	Generally, digital storytelling arouses learners' interest and motivates them to learn. This promotes intrapersonal intelligence in learners.

Brown, Bryan and Brown (2005), assert that DST strategy improves variety of skills, which combines different types of literacies and abilities. Digital storytelling offers ways to activate students' multiple intelligences in the classroom. Practically, many of these intelligences could be developed through systematic integration of digital storytelling strategy into instructional delivery. Digital storytelling allows teachers to leverage the capability of media to effectively develop multiple intelligences during classroom instructions, (Dreon, Kerper and Landis, 2011). Christodoulou (2009) affirms that the multiple intelligences theory recommends that teacher should present instructional content in variety of ways, to respond appropriately to diverse learning needs of students in the classroom. Digital storytelling remains a powerful tool that conveys instructional contents in a variety of ways, through pictorial representation, emotional content, deep learning, interaction among students in the classroom and promotes collaboration and teamwork.

2.1.2 Situated Cognition Learning Theory

Brown, Collins, and Duguid (1989) are believed to have developed situated learning theory and the proponents argue that effective learning activities require learners to enter the socio-cultural situations in the environment, in such a way that they can comprehend and interpret the learning content. The proponents identified four elements as a theoretical basis for effective classroom activities. In the first element, students in the classroom can learn the content by applying knowledge that had been acquired previously. In the second element, students engage in problem-solving activities when they learn from diverse situations in the society. Third, students in the classroom realise the implications of knowledge that had been learnt. Finally, teacher assists students in structuring and contextualising knowledge in ways that the skills and knowledge could later be used in the society. Collins (1988) defines this theory as the process of acquiring competence in particular contexts that reflect the way these efforts will be deployed in solving real life problems, after the instruction. In this wise, situated cognition learning theory affords learners the opportunities to be immersed in learning activities which could be approximated, as close as possible, to the context that the newly acquired knowledge will be applied to solve real life problems (Schell and Black, 1997).

The proponents of situated cognition theory believe that teaching a concept like acquisition of foreign language will be more productive, if the students are immersed in context of cultural activities, rather than concentrating on paper-and-

pencil activities which could disconnect classroom instruction from real life situation in the larger society. The theory argues that there is a connection between learning and experiences of goal-oriented actions in the material and social world (Churchland 1986; Damasio, 1994).

This learning theory could be used to explain the processes that are involved in digital storytelling strategy. There seem to be a strong connection between situated cognition theory and the use of digital storytelling for classroom instruction. Although, cognitive apprenticeship provides a structure for the use of this theory in the classroom, emerging technologies and multi-media resources have the capabilities to effectively immerse students in real life experience. The capabilities of multi-media resources embedded in digital storytelling afford learners the opportunity to establish a connection between the concept being taught in the classroom and real life situation in the society. Creating case studies and scenarios, simulation and digital storytelling are important ways of immersing students in real life experience. In this case, the real-life experience creates a strong context for the whole digital storytelling exercise. This is well encapsulated in Burmark (2004) submission that DST remains an effective instructional strategy to assist learners create new ideas, involve in critical thinking and make decisions, which can expand students' level of understanding in a situated environment. Digital storytelling practically involves a systematic application of multiple media, new and user-friendly technologies, to the art of storytelling and therefore makes students participate in classroom tasks (Haigh and Hardy, 2010; Stacey and Hardy, 2011).

The implication is that digital storytelling affords teachers and students the opportunity to overcome the challenge of abstractness with multi-media and interactive resources to stimulate and motivate learners through a direct contact with learning content. Storytelling can, indeed, act positively on the ability of learners in bridging interpretations that allow them to build connections between contextual elements (Dogan and Robin, 2009). It should be noted that digital storytelling is a meaning-making process as students need to interpret and give meaning to the content of the package. The power of multi-media resources and digital tools used for digital storytelling gives room for the effective immersion of students in learning content that approximates classroom activities with real life situation, and this is the hallmark of situated cognition theory.

2.1.3 Elgazzar Instructional Design Model

Elgazzar (2002) instructional design model was used in guiding the design and development of digital storytelling package for geography students.

The model as it is shown in Figure 3.1 has five interrelated phases: Analysis, Design, Production/ construction, Evaluation, Use, and Feedback.

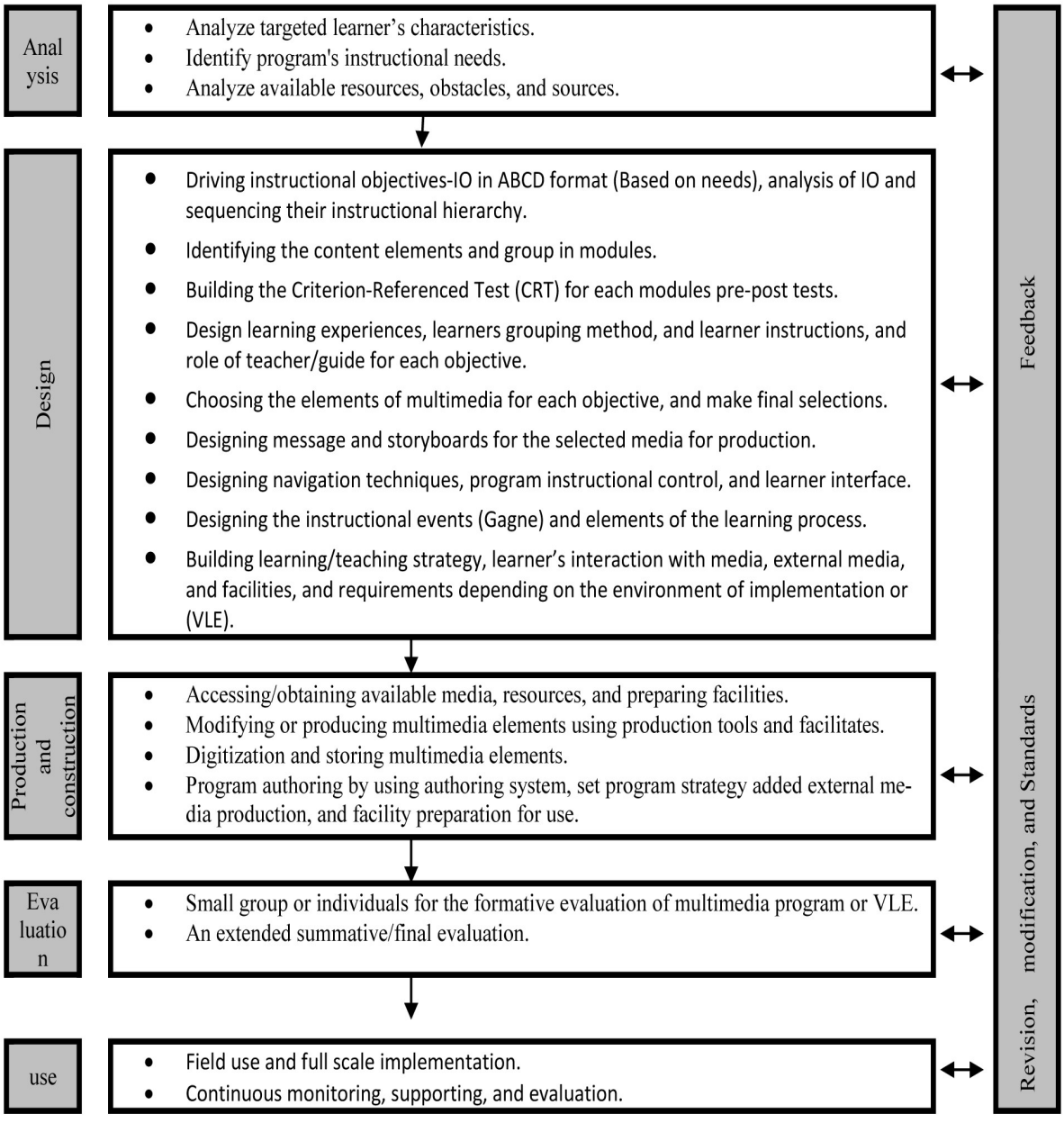


Figure 2.1. Elgazzar Instructional Design Model

The strengths of this ID model are:

(i) This model provides opportunity for feedback at every stage of design and development process. This meshed perfectly with the processes that were involved in creating the digital storytelling as the researcher needed to get feedback and comments from educational technology experts on different elements in the package.

(ii) The design stage of the model emphasises the need to select appropriate media elements and create storyboard to combine these elements before going into production. Selection of appropriate media and creation of storyboard are strategic steps in creating digital stories for classroom instruction.

(iii) Production and construction stage in the model emphasises the pivotal roles of digital tools in multimedia based instruction.

(iv) Lastly, the model gives room for field testing of an instructional package at the delivery stage.

Table 2.2. Adapting the ID model to develop digital storytelling package

Stages in the Model	**Implications in the Package**
Analysis	The needs and characteristics of the students had been analysed at this stage, especially, in terms of their age and educational level. Availability of functional computers in the selected secondary schools was also considered.
Design	The researcher: Gave attention to the details of the content. Created stories around concepts in form of scripts. Created storyboards to effectively combine different media elements for the story on paper before production could begin. Searched for relevant materials in form of pictures, soundtracks, videos and graphics for the story.
Production and Construction	This is the production stage and the researcher: Used digital tools (Camtasia) to develop DST package. Explored the capabilities of digital tools in storytelling.
Evaluation	The prototypes had been assessed by educational technology experts, geography teachers and students. Digital storytelling rubric had been used to evaluate the quality of the package.
Use	The package produced by the researcher was used to teach senior secondary school students at the delivery stage.

2.2 Conceptual Review

2.2.1 Map reading and its importance

The importance of geography in nation's growth and development cannot be over-emphasised as it prepares the future generation for the challenges of the modern society. The general objectives of geography in this part of the world are:

(i) This subject should develop in citizen, a sense of responsibility towards the society;

(ii) It promotes respect for accurate approach to investigating geographical phenomena among geography students;

(iii) To properly appreciate spatial relationships on the earth's surface, Okunrotifa (1973).

Geography deals with understanding geographical phenomena in different regions across the globe and our connections with those areas. It is important that students at different levels study the geographical landforms, climatic conditions and cultural structures of their community and those of other places of the world to appreciate how other people manage environmental challenges at different times. Gersmehl (2014) asserts, that "this knowledge will equip students with the capabilities to understand an increasingly interconnected and highly competitive modern world". In the recent time, different fields of knowledge are increasingly dependent on geography to enhance problem solving skills and predict the result of human interaction with the environment. Cochran and Miller, (2013) affirm that it is a field of study that examines the nature of space and gives justifications for location of features across the landscapes. In other words, geography examines the spatial relationship between map and geographic features in his immediate environment.

Map reading remains strategic in the study of geography at all levels of education, as it connects all other components of geography like human, physical and regional geography in secondary school. Recognising the importance of geography in school curriculum, Nigerian Educational Research and Development Council (NERDC) introduced a new geography curriculum to engender link and flow of themes and concepts from SS I to SS 3 levels, before which social studies is expected to have laid the prerequisite knowledge at the JSS level (NERDC,2007). At the senior secondary school education level, the geography curriculum comprises physical, human, regional geography and map reading components. Among the different components of geography, mapwork stands out very significantly. This is the reason

why notable geographers usually describe geography around map as map remains a critical tool in the hands of geographers. Many scholars such as Mansaray (1992), Egunjobi (2002) and Oludaisi (2011) had examined the imperative of map reading in the actual improvement of students' attitude and academic achievement in geography. In most cases, these researchers agreed that maps are critical elements in the study of geography at all levels of education. One of these maps is the topographical map that is used for map reading exercise in Nigeria secondary schools. Topographical map basically reveals the specifics of the landforms in a region with the help of contour lines and other map symbols (Egunjobi, 2002).

Area of disciplines like history, social studies, surveying, economics and other areas of fields of endeavour require the abilities to read and interpret maps for effective operations. Ofomata (2006) believes that different types of maps improve the realisation of the objectives of geography as the map is the unique tool of the geographers to examine spatial relationships on the earth surface. These are the pointers to the fact that geographers usually define geography around maps and map use in different areas. The knowledge, skills, abilities and competencies that students gain during map reading exercise could help in effective learning of other aspects of senior secondary school geography and even other subject areas. In other words, geography equips individuals with required skills and knowledge to function effectively and contribute immensely to the development of the society. Ensuring functional geography education, therefore, prepares people with sound knowledge to confront societal challenges, now and in the future.

2.2.2 Students' achievement in map reading

Effective geographical education enables students make significant contributions to the development of a country by applying geographical knowledge that would help them interact positively with their immediate environment and protect the natural resources therein. Therefore, the knowledge of geography serves dual purposes of affording students the opportunity of relating constructively with the environment and also protect and preserve the resources for overall development of the society. Map reading is an area of study in Nigerian secondary schools where students acquire relevant skills and knowledge to understand geographic phenomena in the society. Therefore, map reading remains strategic in understanding and interacting with the environment.

However, the performance of students in map reading in particular and geography in general, has not been encouraging over the years. Map reading, especially, has been acknowledged by many students as one of the most challenging aspects of geography at different levels of education (Akorede, 1981; Adegoke, 1984; Adebisi, 1988). Many students consider geography as a field of study that could not be understood by average students. In most cases, students carried this misconception to their final class when they would write their terminal examinations. This could have negative effects on students' academic achievement in map reading and geography as a subject. WAEC Chief Examiners' reports have emphasised persistent poor performance of geography candidates in map reading component of geography (WAEC, 2004, 2005, 2007, 2013, 2014, 2015 and 2016). For instance, the 2011 report affirms that most candidates found it difficult to determine inter-visibility between landforms on the topographical map. This has resulted to poor performance of candidates in map reading aspect of geography. Also, 2013 report explain that incompetence in mapwork exhibited by many candidates has resulted to their poor grades in geography over the years.

These reports are in line with the study by Falode, Usman, Ilobemeke, Mohammed, Godwin and Jimoh (2016) which asserts that students' performance in map reading determines, to a great extent, the general performance in geography. In most cases, many students criticised geography especially, map reading aspect, as being problematic and boring. Therefore, teaching map reading effectively in the classroom remains a daunting challenge to many teachers because students' performance in this aspect of geography has not been encouraging over the years (Obondo et al., 2013). Idoko (2009) observes that the prevalent conventional teaching method in Nigerian schools contributes immensely to students' poor academic achievement in map reading in particular, and geography as a whole, in our secondary schools.

2.2.3 Students' attitude towards geography/map reading

Understanding students' attitudes is strategic to support their learning outcomes in a particular discipline. It seems difficult to organise instructional process and provide desired behavioural changes in an environment where students' attitude is ignored. Ulnar (2012) asserts that student's attitude is important to the teacher in two aspects. One of them is to offer students with improved attitude towards a course and the second aspect is to alter the negative attitude to positive. Personally, the reseacher

believes that students' attitude goes beyond this assertion made by Ulnar (2012) as the attitude of learners in the classroom, in most cases, determines the successful implementation of instructional process. Teachers could not provide students with improved attitude, but rather motivate them to have a change of disposition towards a particular subject through appropriate instructional delivery. Walker (2006) notices that adequate attention had not been given to the study on students' attitudes towards geography and he affirms that students have higher achievement with subject matter when they have favourable disposition towards the instructional content. In another research, students who had positive attitudinal disposition to a course content had improved performance than their colleagues with unfavourable disposition after the experiment, Zacharia (2003).

One of the problems with the teaching and learning of map reading is the negative attitude of some students towards the concept. Some students consider map reading as one of the most challenging aspects of geography to understand, as some geography teachers present the concept as an abstract body knowledge that is disconnected from real life situation. In the submission of Amosun (2002) "the concept has been acknowledged as among the most difficult aspects of geography by secondary school students, and this misconception probably account for the mass failure of students in map reading". This has resulted in negative attitude of students to geography and map reading in our schools.

Many students in Nigeria consider geography as one of the most difficult subjects and therefore, display negative attitude towards the course. According to Amosun (2016) many students have practically been infected with negative comments by their seniors in schools, concerning the nature and content of geography. People in the society are found of making comments such as; geography is too wide to comprehend, map reading is quite difficult to understand and involve a lot of abstract thinking. These comments are usually spread around within and outside the school environment with the resultant effect of negative attitude by students towards map reading and geography in general. Mwenesongole (2016), who considered the factors influencing learners' achievement in mapwork revealed that "a lot of students score poorly in map reading due to inadequate positive attitude towards executing map reading tasks in the class. The study concludes that that there is a strong need for re-training and re-skilling of the teachers involved in teaching map reading in our schools right from the elementary level. In other words, geography teachers need to

have access to digital tools that could be used to demystify map reading and the issue of training teachers to use these devices should be given utmost priority.

A study carried out by Mohammed (2014) showed that many students had negative attitude towards geography. On a general note, as far as lack of interest is concerned, the results from the focus group discussion with the students points to the fact that this emanate from lack of infrastructures such as geography laboratories, weather stations and other infrastructures needed to demystify the subject and make it more realistic. 90% of the respondents in all the school sampled were of the opinion that geography is a very tough subject to learn. Mohammed (2014) acknowledge that it is paramount to make this subject more interesting by using technology to positively change students' attitude towards the subject. In essence, one pragmatic move to positively alter students attitude to the concept of map reading is to systematically integrate digital tools in instructional process, to stimulate students' interest and make map reading more engaging.

Therefore, the school system should provide conducive environment to motivate learners to develop positive attitudes towards the study of map reading and geography as a school subject. Studies had indicated that learners would be motivated to participate in classroom tasks, if the instructional content is interesting, practically applicable and useful for their future professional careers. Students' attitude, to a large extent, determine their participation in different aspects of geography (Milan, Tomáš and Katerina, 2012). It had been observed that students display negative disposition towards geography because many of them consider it as difficult, boring, ambiguous and abstract pieces of information. When teachers understand the strategic role of students in classroom, provide conducive setting for active involvement by unifying and connecting curriculum content with learners' immediate environment, then, students' attitude towards geography and map reading in particular would be significantly improved. If teachers, therefore, intend to work towards achieving the objectives of teaching map reading, then, classroom instruction should be well structured to arouse students' interest and positively alter their attitude toward the concept.

2.2.4 Engaging learners in classroom activities through digital storytelling

The strategic role of learners engagement in classroom instruction cannot be over-emphasised at all levels of education as it goes a long way in determining the success or otherwise of teaching-learning process. Leaners need to be engaged in classroom activities through effective collaboration and teamwork. Many scholars have consistently advocated for the need to evolve more student-centered approaches that allow students to participate in instructional process instead of teacher-centered strategies that give passive roles to students in classroom activities (Teo (2010), Sadik (2008), Bernard (2008)). Teachers are no more 'sage on stage' but they are now 'guides on the side' in instructional process. Learners are, therefore, taking up active role in learning construction, where teachers only serve as facilitators of knowledge. Even with the increasing use of technology in facilitating instructional delivery, studies have shown that many teachers, across all levels of education, still find it difficult to properly engage learners in classroom activities, Teo (2010). The reason is quite obvious. Technology could be used to replicate the conventional method of teaching. Holmes (2011) assert that ' many teachers wrongly execute technology integration process, as a result of incompetence in technology-based instruction and as such, teachers are finding it difficult to use appropriate technological tools to engage learners in instructional content'.

Hughes (2005) categorised technology-supported pedagogy into three categories: (a) using technological tool as a replacement, (b) using technological device as an amplification, or (c) using technological tool as a means of transformation. Using technological tool as a replacement indicates that technology serves as another channel to achieve the same instructional objective. For instance, a teacher could decide to present an instructional content with the aid of power point presentation (PPT) in place of writing on the chalkboard or allowing students read it from their textbooks. This could be regarded as the process of using technology to replicate the traditional form of teaching. In another case, the use of technology as amplification involves the utilisation of technological device to execute instructional tasks more efficiently and usually without altering the content of the original tasks. Finally, technology could be used as a means of transforming learning innovatively by re-organising students' instructional content, engaging learners in classroom activities, and changing instructors' roles in the classroom. What could be deduced from this categorization is that teachers could adopt the use of technology and yet, not

properly engage learners in instructional process. Technology should be employed in such a way that students in the classroom would become active participants and co-constructors of knowledge by taking responsibility for their learning. In other words, technology should not be used to replicate the conventional form of teaching, but rather, it should be systematically integrated to change instructional pattern from teacher-centered to student-centered approach. There is, therefore, a need to adopt a strategy that would fill this instructional gap and allow teachers to use technology more appropriately to engage students in instructional process. Digital storytelling could be used to make students active participants in instructional activities.

Lambert (2002) identifies 7 elements of digital storytelling and these are:

1. Point of View: this element allows storyteller to use his personal expression and experience in the process of creating digital storytelling.
2. A Dramatic Question: Dramatic questions are narratives that keep viewers at suspense throughout the story content.
3. Emotional Content: This has to do with emotional component of the story. This could be quite rewarding to storyteller as it validates and justifies the effort and investment that had been made in creating the story.
4. Economy: Economy is sometimes the most challenging aspect of digital storytelling for both novice and experienced storytellers. An educational digital storytelling should neither be too long nor extremely short. According to the specification from the Digital Storytelling Centre (now StoryCentre), DST ranges from three to seven minutes videos for instructional purposes.
5. Pacing: For writers, pacing means rhythm of the story which should neither be too fast nor too slow. It is important to prepare for this element during the scripting process, in order to allow a natural flow of thought.
6. Voiceover: Digital storytelling allows students to record themselves while reading their scripts, using digital tools like movie maker or camtasia.
7. Soundtrack: Music is an important but optional element of digital storytelling exercise.

Based on these key elements, digital storytelling had been identified as an instructional strategy that allows students to interact directly with technology. Combining the traditional art of storytelling with modern technological devices, the end product is an instructional package that engages learners in teaching-learning process. Digital storytelling, therefore, provides an appropriate convergent platform

for traditional storytelling and technology to effectively interact and facilitate classroom activities. Using digital storytelling for classroom instructions serves dual purposes. First, it allows both teachers and students to have direct contact with technological tools to facilitate instructional process. Also, digital storytelling provides a veritable platform for effective learners' engagement and active participation in classroom instructions as they would be able to search for materials and use technology to construct their learning. Digital storytelling could engage and simultaneously coordinate three different senses of human system i.e. eyes, hands and ears for instructional purposes (Van Gils 2005).

Therefore, DST facilitates student-centered learning and the figure below appropriately depicts this capability.

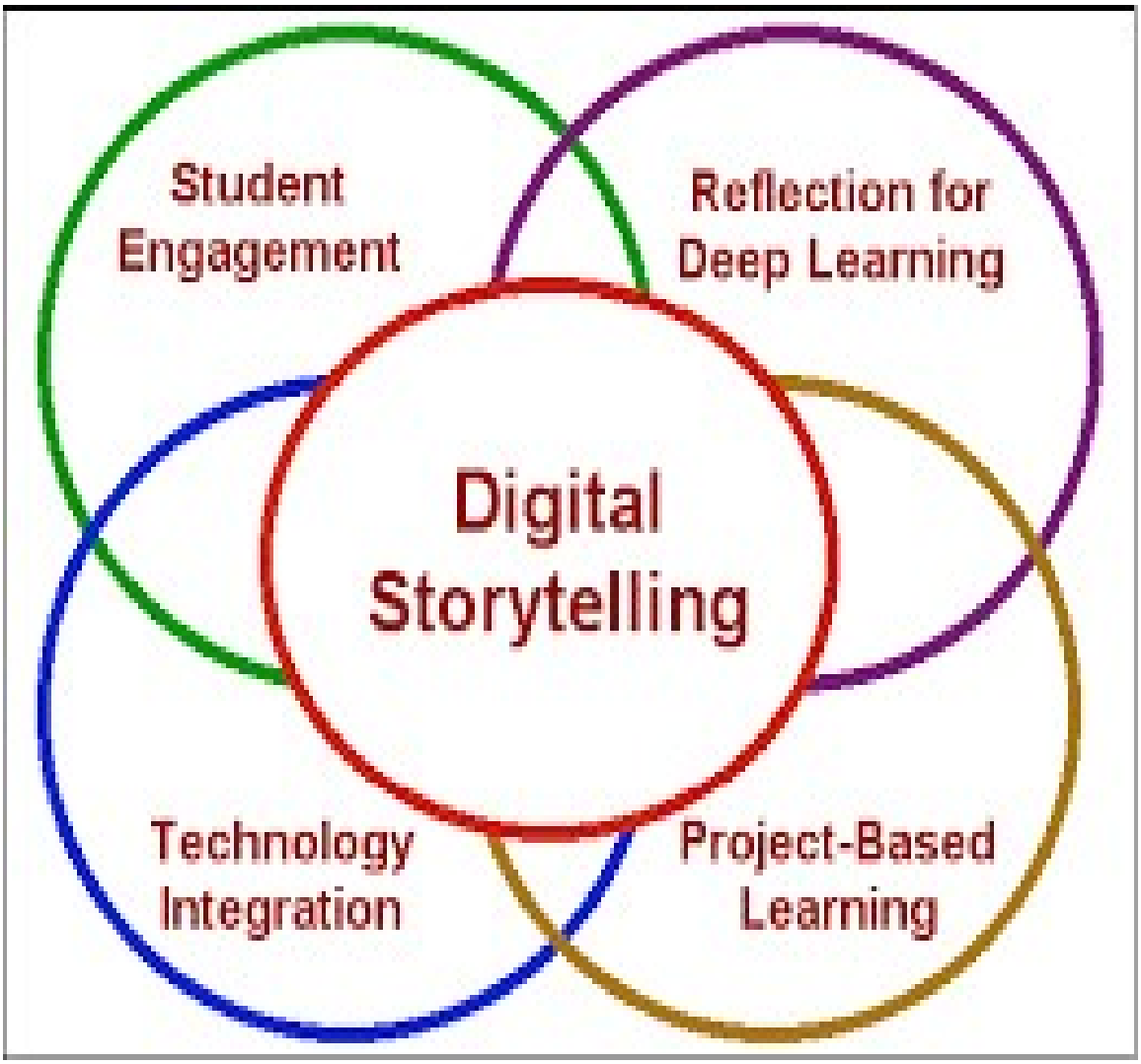


Figure 2.2. Convergence of student-centered learning strategies

Based on Barrett's findings, digital storytelling combines students' level of engagement and integration of digital tools into instructional practices, which are generally considered as student-centered approaches, Barrett (2006). The affordances provided by digital storytelling strategy allow teachers to engage learners in instructional activities, through the use of appropriate pictures, soundtracks, videos and emotional content to present different concepts in the classroom. Personally, the researcher is of the opinion that digital storytelling has overarching influence on the technological capabilities of teachers to effectively use digital tools in motivating students in the classroom, to give attention to the details of the instructional content. The use of appropriate local pictures and videos in creating DST engages students in instructional activities and they would be able to connect classroom activities with the features in their environment.

2.2.5 Benefits in using digital storytelling strategy for instructional delivery

The instructional gains that are derivable from integrating digital storytelling into classroom activities are enormous and scholars are increasingly advocating for the need to encourage teachers to use this strategy to engage learners in classroom tasks. DST encourages the merging of four student-centered learning approaches i.e. deep learning, project-based learning, active student engagement and integration of technology into classroom practices. Psomos and Kordaki, (2012), assert that digital storytelling offers the following benefits in instructional process:

(a) digital storytelling motivates students to work in groups and strengthens interaction and collaboration;

(b) students could acquire technological competences through this strategy;

(c) it caters for students with learning difficulties, as students becomes active participants in instructional process and

(d) improves students' narrative and technological abilities in the classroom.

Engaging and motivating students in instructional content are always key parameters to measure successful learning at all levels. Recent studies have emphasised the pivotal role that teachers have to play in designing meaningful instructional tasks that cater for students' diverse learning needs (Pintrich and Svinicki, 2004). DST is capable of providing students with realistic scenarios that are suitable for their personal experiences, make curriculum content to be applicable to students' needs and learning styles in the instructional setting. Digital storytelling activities allows students to gain confidence, competence and capabilities to give

attention to the details of the instructional tasks (Neo and Neo, 2010). Digital storytelling fosters self-control learning, self-expression and reasonable decision-making process. By participating in DST activities, students would be able to meticulously select appropriate media content or deduce meaning from the content of the story they watch. This allows students to develop personal products that meaningfully support their learning goals, thereby developing technological and media skills of the students. Digital storytelling stimulates students' motivation to learn instructional content and encourage problem-solving skills, propelled by interaction and teamwork.

One important contribution of digital storytelling to instructional process is the ability to promote students deep learning and higher order thinking skills in the classroom. For long, instructional learning domains have been restricted to knowledge and comprehension levels in most cases, at the expense of other higher order domains of learning. Meanwhile, students need more than these lower order thinking skills to survive in this modern society. In other words, the challenges in the larger society require students to deploy the use of higher learning domains like synthesis, creating and evaluation to take critical decision the digital-driven economy (Abdel-Hack and Helwa, 2014). These higher order thinking skills are required of students, to be successful and effective learners in digital storytelling classroom. Sims (2004) believes that "the process involved in telling stories and listening to the story content requires the use of many critical thinking elements, such as synthesis, deductions and interpretations to make meaning out of the stories".

Gils (2005) identifies some benefits of using digital storytelling in classroom as follows:

(a) it provides more alternatives than using only conventional method that is particularly monotonous;
(b) it allows students to personalise instructional content;
(c) it brings out more compelling and revealing meaning from the content;
(d) it makes learning to be real, connected to real life situation and
(e) it promotes active participation of students in instructional tasks.

All these instructional benefits indicate that DST remains a veritable tool to engage todays' learners in teaching-learning process. It should be noted that one important language that the modern generation of students understands, is the use of technology to execute different tasks. Using digital storytelling would, therefore,

afford students the opportunity to learn with technological tools that are inherently part of their generation.

2.2.6 Group-based digital storytelling

Group-based strategies like cooperative learning, collaborative learning and problem-based learning had been identified as critical in developing students' interpersonal skills, critical thinking skills and classroom interaction. Scholars consider project-based learning as an effective strategy that appeals to students' reasoning, as it encourages data collection, exploration of facts, discussion and presentation of reports among the students (Koh, Herring, and Hew, 2010; Chu, Tse, and Chow, 2011). In the same vein, (Krajcik, Czerniak, and Berger, 2003) affirm that students who partake in project-based learning strategy would be afforded the opportunities to interact freely and share opinions with other members of the class through collaboration and teamwork, more easily than students under individualised instruction.

The power of collaboration and teamwork in group-based digital storytelling allows students to take collective decision and make meaning out of the instructional content. It is expected that collective decision-making in group-based digital storytelling translates into active engagement in instructional content (Huesca, 2008). Spurgeon, Burgess, Klaebe, McWilliam, Tacchi and Tsai (2009) note that the process of conceptualising ideas in workshop-based digital storytelling is a co-creative practice, which allows students to interact within the groups and freely exchange ideas and information in instructional setting. Robin (2008) asserts that digital storytelling strategy primarily engages students in meaningful discussion and also assists in presenting results in a way that promotes clarity of thought, after listening to the story content. According to (Hung, Hwang and Huang, 2012) this strategy remains an effective medium for teachers to encourage interaction among students in learning environment. In other words, group-based digital storytelling affords students the opportunity to be co-constructors of knowledge through exchange of ideas and collective decision-making process. Aneta and Craig (2010) conclude that digital storytelling prepares students and teachers for active classroom engagement to achieve previously stated objectives.

This emphasises the power and capability of group-based digital storytelling in rejuvenating the spirit of collaboration and teamwork in instructional setting. This, in turn, would engender collective decision-making on critical issues both within the school setting and in the larger society. It should be noted that collaboration and

teamwork, which are the hallmarks of digital storytelling, are some of the prerequisites for a nation to develop in all critical sectors of the society. Therefore, group-based digital storytelling could ease the process of instruction and also build the value of collective decision-making that could be useful to students after the school life.

2.2.7 Individual-based digital storytelling

Digital storytelling is a strategy that stimulates students' latitude of creativity and also develops their intrapersonal characteristics. It is generally considered as a motivating instructional strategy that promotes critical thinking of the 21st Century students, who prefer to learn with the use of digital tools. This is the hallmark of individualised DST as it allows students to develop critical thinking skills and move at their own pace through an instructional process. In specific terms, digital storytelling affords students the opportunities to come up with an instructional story that relates to their area of specialisation and according to their personal experiences, Ana (2015). Individualised digital storytelling combines the conventional art of storytelling with diverse digital multimedia, like pictures, audio, and video, based on the personal experience and technological capabilities of individual students in the classroom, Robin (2012). This implies that the strategy allows students to deploy their personal experience and capabilities to make decision and give individual meaning to the instructional content. This could enhance deep learning as students' give personal interpretation to the content of instruction.

Ana (2015) asserts that "there is clear evidence that the individualised form of digital storytelling has been effective among higher students of aerospace engineering especially in the area of promoting non-linguistic abilities and also enhancing acquisition of language of the participants involved in the study". By interacting with the content individually, students learn through reflection and use their personal experience in narrating the stories among their counterparts in the classroom (Cortazzi and Jin, 2007). In assigning tasks that require students to select, analyse, evaluate or synthesise information from materials, individual-based digital storytelling could be a good fit to achieve these instructional objectives. In other words, individualised digital storytelling gives due consideration to students' individual differences and this makes it suitable to reach students with diverse learning styles and abilities in the classroom. The process of searching for story materials or simply watching digital storytelling package, gives students the opportunities for deep mastery of the

instructional content being disseminated by the story (Ellen, 2012). When students are allowed to have one-on-one interaction with digital storytelling package, it could increase their level of engagement and afford them the opportunity to give attention to the details of the instructional content. This could positively impact their achievement and attitude to the content of instruction.

2.2.8 Students' computer anxiety in the classroom

The integration of technology into classroom instruction is being affected by a number of factors among which are computer anxiety, technology familiarity, ICT competence, technological resources, computer self-efficacy, technology anxiety and attitude of students. Generally, computer anxiety has to do with the fearfulness or apprehensiveness that students exhibit when confronted with challenge of using computer for classroom activities. In their submission, (Saadé and Otrakji, 2007) assert that factors such as availability of technological resources, past failure and successes with computer usage, and the technological demands of the current tasks, are all parameters to measure the state of computer anxiety students could experience when confronted with the need to use computer for instructional purposes. This assertion could be considered relevant, especially in this part of the world where a significant number of students do not have access to computers and other computer-related technologies during their formative years. In Nigeria, for instance, many of the students in public primary and secondary schools are not usually given the opportunity to interact with computers and other digital tools like their counterparts in developed countries of the world. Many of them are, thus, put at a disadvantage when it comes to the issue of using technology for classroom instruction. The resultant effect is the increase in students' level of anxiety when they are confronted with the need to use computer-related technologies for classroom activities.

Agbatogun (2010) states that the level of computer anxiety of both teachers and students are substantial factors in considering the integration of computer-related technology and other digital tools into educational practices. An instructional setting that is incorporated with user-friendly digital tools usually affords teacher the opportunity to reduce the level of anxiety and assists students form relationships across the boundaries of disciplines and skills for effective classroom instruction (Lawson, 2005). In a study carried out by Sadik (2006), it was reported that two factors generally affect the use of technology in the classroom and these are teachers' and students attitude and computer anxiety, especially while participating in

computer-related activities at different levels of education. This implies that teachers also exhibit some level of anxiety, when it comes to the issue of using technology for instructional delivery. Unless teachers are confident, competent and comfortable with the use of a particular technology, they might be unwilling to deploy such devices in classroom instruction.

Phelps and Ellis (2002) believe that every student is confronted with the challenge of computer anxiety in acquiring skills and knowledge and it is therefore important for teachers to be resourceful and creative enough to adopt the use of instructional strategy that would help learners overcome this challenge. What could be deduced from this assertion is that students need not to be involved in computer-related activities before being affected by computer anxiety, as many 21st century learners are daily confronted with the need to use technology to execute one task or the other. The onus, therefore, lies on the teachers to employ strategies that would equip learners with skills and knowledge to function effectively in this modern society. It is advisable that even the conventional teaching strategy could be enriched with technology to reduce this kind of anxiety in the students.

2.2.9 The concept of students' perceived relevance of map reading

The perceived relevance students hold about any course somewhat determines their attitude and success in that subject. Students appreciate instructional activities that equip them with the required knowledge and competences, to function successfully in the modern society. Therefore, if students consider a particular school subject as being relevant to solve their problems and make them functional members of the society, then, they would give such a course an utmost priority. Özgen (2011) defines perception of relevance of geography as the state of understanding the interaction between man and environment in accordance with personal senses, interpretation, opinions and needs.

The perceived relevance of students is crucial to effective study of science subjects and the ability to make connections between the sciences at different levels of education (Hohman, Adams, Taggart, Heinrich, and Hickman, 2006). Osborne et al. (2003) states that "attitude of students toward science-related subjects is basically a function of perceived relevance, and in the absence of this indispensable constituent, sustaining students' interest in instructional content becomes nearly impossible". In other words, it would be practically impossible to maintain students' interest, when they do not consider the subject as being useful in surmounting their daily lives

challenges. This implies that little could be achieved in instructional process unless students perceive the concept as being relevant and act accordingly. Relevance is closely related to attitude and student ability to make connections between a subject and everyday activities in the society (Coker, 2009). These are the reasons why the concept of perceived relevance remains central to the problems confronting map reading activities in our schools. The classroom teachers need to do more to make instruction real and connected to real life situation, so that students would appreciate reasons why they should engage in map reading activities.

Scholars (Egunjobi (2002): Amosun (2002): Falode (2014)) have argued that many geography students perceive the subject as one of the most difficult subjects to understand and this affects their achievement and attitude towards the course. Many geography students in Nigeria consider the subject as a pile of abstract and ambiguous concepts that could not be related to the real life situation. It is almost illogical to expect students to go through the rigour of studying a course that could not help them solve their problems now and in the future. If students perceive map reading as a relevant concept that would equip them with knowledge to relate positively and understand their environment, they could put in more efforts to understand it.

Weeden (2007) studied the influence of enjoyment and relevance on students' choice to participate in map reading and found out that, although students attend geography classes, many of them did not see any tangible reason to study map reading in the classroom. In other words, many students have not been able to identify the real purpose for geography education and in particular, map reading, to solve their immediate problems and future professional challenges. This could not be unconnected with the inability of geography students to effectively relate the information on the topographical maps to the features in their immediate environment. Ostensibly, if the student's view of map reading is limited to the features on the topographical map, it will be quite difficult for that student to transfer abstract concepts to other contexts, especially within his environment. This reduces the applicability of map reading in understanding the interaction between man and his environment, which is the essence of studying geography at secondary level of education.

If educational stakeholders really need to positively alter achievement and attitude of students towards map reading, then, there should be a strong commitment by geography teachers to adopt the use of interactive instructional strategies that

would allow students relate features represented on the map to the landforms and relief in their environment. Digital storytelling could be used to engage learners in map reading activities and when stories are created using short videos and pictures within their immediate environments (LMC), geography students could consider knowledge of map reading as being useful to positively relate with the environment.

2.3 Empirical Review

2.3.1 Studies in map reading

Map reading remains an important component of geography and disseminating this aspect in the classroom has been confronted with a lot of challenges. Scholars had provided different interventions with a view to demystifying the concept and make it less abstract. The current lecture method which is being used by many teachers in secondary schools to teach map reading seem to be inadequate as the concept requires interactive strategies that could reduce the level of abstractness and make it connected to real life situation. Different strategies have been used by scholars to enrich instructional delivery of map reading at the senior secondary school level. Tshibalo (2003) found that students who studied practical geography by means of cooperative learning strategy did significantly better than their counterparts who used talk and chalk method.

The implication is that geography teachers need to be dynamic in their approaches to teaching map reading and integrate a more friendly and student-centered strategy that could engender interaction and collective decision-making. Pandian (2004) cited in Oludipe (2012), examined the impacts of cooperative computer-assisted learning method on learners‘ performance in geography, findings from the study revealed that there is no significant difference in students’ performance in the subject based on gender. Amosun (2002), found out that cooperative learning strategy was more effective in improving students‘ performance in map reading, map reading skills and attitude to geography in Nigerian secondary schools. Furthermore, cooperative learning strategy in practical geography can enhance students‘ reading and interpretation of topographical maps and increase the accuracy of measurements done by cooperative group.

Apart from the different teaching strategies that had been used to facilitate map reading instruction in schools across the globe, various technological tools and software had been developed by scholars to demystify this concept and make it real. The results showed that technology could have significant impact on the academic

performance and attitudinal disposition of students towards map reading. For instance, Egunjobi (2014) deployed computer assisted instruction (CAI) in three modes to determine the effect on students' performance in map reading in southwest Nigeria. The result revealed that students, who were exposed to the map reading content using computer assisted instruction (CAI) modes scored good grades than those in the conventional mode after the experiment. Falode, et al (2016) indicated that a significant difference exist between the attitude scores of the two groups in favour of students exposed to computer simulation instructional package in map reading after the experiment. Tella and Bashorun (2012) examined attitude of students to instruction, when they learn the content through computers. It was discovered that when students used computer assisted instructions, their attitude changed positively towards the content taught in the classroom.

2.3.2 Studies on using digital storytelling for classroom instruction

Digital storytelling had been identified as an effective instructional strategy that could be used to enhance instructional delivery. Several studies had been carried out across the globe to determine the effectiveness of this strategy in teaching-learning process. Abdel-Hack and Helwa (2014) examined the efficacy of two modes of computer-related technologies (DST strategy and Weblogs instruction) to promote students' exploration and writing abilities among English Language majors in the university. Findings indicated that students in the experimental group performed significantly better than their counterparts in the control group. More importantly, it was reported that participants in digital storytelling mode displayed high level of improved skills in writing and communication than their counterparts in the conventional mode (direct teaching).

In other words, digital storytelling strategy promotes the development of critical communication skills that students need to function within the school system and in the larger society. As explained by multiple intelligences theory, an efficient and effective teacher needs to package instructional content in such a way that these important communication skills would be systematically developed through the course of instruction. Digital storytelling provides a viable platform for the teachers to improve these important skills that could promote students attitude and improve their performance in map reading and other critical aspects of geography.

In the same vein, (Yang and Wu, 2012) examined the influence of digital storytelling strategy on English students' critical thinking, motivation and academic achievement in secondary school. The results showed that students in DST mode had higher performance in terms of enhanced critical thinking abilities and improved motivation to learn instructional content, than the participants in lecture-type mode who only listened to instruction through conventional approach. The qualitative result from the study indicated that teachers and students believed that digital storytelling promoted deep learning, simplification of instructional content, readiness to explore and critical thinking ability during classroom instruction. This implies that in addition to engaging learners in instructional content, digital storytelling develops learners' critical thinking capabilities. In other words, teachers using this strategy would have the opportunity to test learners' higher order thinking, beyond knowledge and comprehension. The reason being that, digital storytelling is a decision making process and students need to think critically to make meaning out of the story content. It should be noted that students need to deploy critical thinking skills at all strata of the society and in their quest to proffer solutions to the myriad of problems in modern world. Using this strategy would be a viable problem-solving effort, right from the classroom. Therefore, digital storytelling would equip the output of our education system with required knowledge and competences to solve societal problems and make the world a better place for everyone.

In another experiment, Kim (2006) trained prospective teachers on the skills to create digital storytelling and after the training, they were required to produce digital stories on women and minority scientists and their disposition to science-related subjects. Qualitative data was generated for the study through semi-structured interview and many students commented that digital storytelling allowed them explore the life and time of minority scientists that had been forgotten in history. This implies that digital storytelling could be used to strengthen our cultural values and rejuvenate past historical development in the society. This has been the main reason why storytelling had remained strategic tool to transmit knowledge, values and norms from one generation to another in the indigenous society.

Digital storytelling would allow students in this digital age explore the past historical development and use the findings to solve present problems in the society. By extension, students would have the capabilities of projecting into the future and judiciously manage the natural resources within the community. Therefore, the

efficacy of digital storytelling in problem solving transcends the usefulness in instructional setting or the school environment. It helps in student's all-round development. Morehead, Li and LaBeau (2007) found that pre-service teachers' computer self-efficacy improved as they were getting closer to finishing their digital storytelling products. In other words, the skills involved in searching for materials from the internet and using digital tool like movie maker, camtasia or photostory to edit media, improved the belief of pre-service teachers to use computer-related technology for instructional activities. Digital storytelling develops multiple technological skills that would allow prospective teachers use digital tools to package instructional content to be delivered in modern classroom setting. In essence, this strategy equips pre-service teachers with competences to function effectively in digital classroom environment that is increasingly becoming technology-based.

Normann (2011) carried out a qualitative research to examine the use of DST in language learning and acquisition of communication skills among higher education students. The qualitative results showed that DST significantly enhanced students' oral and writing skills at the end of the experiment. The study also showed increased motivation among students after the experiment. Students in digital storytelling classroom are usually required to write the script for the story, create storyboard, search for materials, record voiceover and present the output in the whole class or to other members of the group. These activities develop presentation and communication skills of the students, which could improve their performance in the subject area and prepare them for challenges in the society after the school life.

In the same vein, Najat, Eva and Sharda (2014) confirmed that DST is a powerful tool in effective learning of curriculum content and create exciting learning environments for the students. DST is an evocative approach for creating a constructivist learning environment based on the principle of student-centered approach to instructional delivery. The results implied that students gave detailed attention to the content with DST as a medium of instruction. In all cases, students liked using technology, searching the internet, editing movies, recording voiceover and watching other digital stories produced by members of the class. This process strengthens exchange of opinions and cross-fertilisation of ideas among members of the class. Digital storytelling creates a community of practice among students in the classroom. Students are willing to take collective decision on classroom activities and help one another where necessary. The implication is that students are able to interact

freely and understand issues from different perspectives. This broadens the latitude of creativity of learners and engenders critical thinking across different concepts in the curriculum.

2.3.3 Group-based digital storytelling and students' achievement in the classroom

One of the major challenges in educational system is how to effectively present instructional content in order to improve students' academic performance. The task of improving the achievement of secondary school students presents a complex challenge to teachers, who are key players in meeting different learning needs of every student in the classroom. The search for instructional strategies to help teachers confront this challenge has attracted much attention from many researchers across the world in the recent past. Teacher's methodology has been associated with academic performance of students. Various instructional strategies have been recommended for use, which have wider applicability across different subject areas and positive effects on academic performance. To this end, Effandi and Iksan, (2007) stated that "the success of any instructional endeavour is basically a function of the strategy a teacher employs in the classroom to engage learners in instructional process". Different strategies could be adopted by the teachers to present instructional content in such a way that will improve students' academic achievement in the learning tasks.

Slavin (2007) found out that group-based strategy had significant influence on students' learning and academic performance, increasing their retention and enhancing their satisfaction with their learning experiences. The findings by Najat, Eva and Sharda (2014) indicated that students took collective decision and gave detailed attention to the digital storytelling content, especially while working in groups. Students execute more tasks while directly interacting with digital resources like computers and digital tools, in place of using conventional resources such as printed media and other library materials. These findings are in line with Standley (2003) who found that DST strategy promotes exchange of ideas among students, resulting in the utilisation of various cognitive capabilities among members of the group. Students' skills are also enhanced by using databases and internet sources in group-based approach. Also, digital media ensured that groups assist one another, as networked digital content connects the whole class; student have better interaction, organisational and communication skills to express opinions in the classroom (Hung et al. 2012; VanderArk and Schneider 2012). The implication of these findings is that

digital storytelling promotes collaboration and teamwork and affords learners the opportunity to share ideas and opinions with other members of the group. When students are equipped with these skills, they would later become useful and functional members of the society that requires consensus building and collective decision-making process.

Ransdell and Moberly (2003) found out that there is a significant relationship between group-based instruction and students' achievement in the instructional tasks. Pandian (2004) examined the impact of co-operative learning strategy on students' achievement and found out that students in experimental group scored good grades than their counterparts who learned the same content (Biology) through conventional method. Uwameiye (2016) affirmed that learners in the group-based approach performed better in Home Economics than students in the control group. Keramati (2010) discovered that there is a significant difference between the achievement score of the students in experimental group (group-based learning), and other students who were taught using the conventional method. Abdullah, (2010) identified the effect of cooperative learning on academic achievement of students and retention in mathematics and also revealed a significant difference between the mean score of students in co-operative learning strategy and control group in favour of the experimental group.

2.3.4 Group-based digital storytelling and students' attitude to Instruction

Teacher plays pivotal role in the successful delivery of instruction at all levels of education. Even with the recent call for paradigm shift in the strategic role of teacher in instructional process from teacher-centered to student-centered approach, the onus still lies on the teacher, as facilitator of instruction, to arrange, plan and structure instructional content to effectively engage students in classroom activities. Huang and Liaw, (2005) affirms that effective use of technological tools in the classroom depends largely on attitudes of teachers involved in the exercise. If teachers believe that the proposed computer-related task satisfies neither their needs nor the students' learning styles, they would not be willing to integrate such device into their repertoire of instructional toolkits.

The disposition of teachers goes a long way in determining whether a particular technology would be adopted for instruction or not. Groff and Mouza (2008) reiterate that teachers' beliefs and attitudinal disposition are critical factors in determining decision making in the classroom and the implementation of new

technologies at various levels of education. Also, the attitude of students to a particular subject usually defines their level of participation in such area of study. Understanding attitude of learners is imperative for supporting their achievements and interest towards a particular subject. Research suggests that students are motivated to learn if the instructional content is interesting, connected with everyday life and useful for their future professional development (Milan, Tomáš and Katerina, 2012).

Teacher could organise instructional content on group or individual basis, depending on factors like availability of resources, instructional objectives, students' population and so on. Digital storytelling instruction could be presented in group or individualised mode. Although the power of digital storytelling usually comes from teamwork and collaborative decision, students could interact individually with the package before group discussion. Students in collaborative group are engaged with the instructional content and become co-constructors of knowledge in instructional process. Group-based instruction is capable of engaging students in deep learning, creativity and also encourages them to be active participants in knowledge creation (Miller, 2009).

Group-based classroom instruction is a classroom management endeavour that emphasizes interaction and a strong sense of collective participation. This method propels students' academic and social development that could make learners to become functional members of the society. Group-based instruction could be in form of cooperative, collaborative or problem-based approach. Cooperative learning belongs to the student-centered learning approach as learners are placed in a position to take responsibility for their learning. This method focuses on the belief that students learn best when working with and learning from their peers in and outside the classroom setting.

Many teachers use cooperative learning to actively involve every student in executing instructional tasks as this collective participation is practically impossible in a conventional or individualised format. The underlying premise in group-based learning is founded in constructivist philosophy. Ifamuyiwa and Akinsola (2008) found that students in cooperative learning group showed a positive attitude towards mathematics than others in the conventional group. In the group-based classroom instruction, each member is responsible for learning the instructional content and also assisting other members within the story circle to learn the materials as well. Students would continue to put in their efforts until each member fully understands the content

and is able to complete the assignment. In this wise, the process in group-based learning creates an environment of collective achievement in the attainment of instructional goals. According to Michael (2010), the process of interacting with students of differing perspectives in group-based learning promotes cognitive development, as emphasis is placed on how to cooperate with other members of the group to proffer solution to a particular problem.

Shin and Park (2008) carried out a research on using digital storytelling in a virtual environment, and confirmed that digital storytelling improved students' participation in instructional tasks and enhanced comprehension of the subject matter. Three modes of DST were conducted: in the first situation, students only listened to the instructional content, the second scenario involved students who listened to the content and reacted accordingly, and finally in the third scenario, students collaborated in groups in the classroom. It was revealed that participants were more active, engaged and focused in the third mode of digital storytelling.

Robin (2011) reveals that collaborative environments promote communication skills among learners by organising their ideas, asking questions and synthesising a diverse content during classroom interaction. This implies that digital storytelling affords students the opportunity to explore their potentials and share opinions with other members of the class. Within digital storytelling group, students were also able to show their projects to other members of the class and exchange ideas during production and evaluation stages (Ibid, 2009). In a study carried out by Bran (2010), it was observed that group-based digital storytelling helped to construct learners' experience in the instructional content, enhanced collaborative activities, promoted classroom discussion, and fostered understanding of complex ideas. The value of collective effort is enhanced with the use of group-based digital storytelling. When students partake in group-based learning, it strengthens their abilities to understand issues from different perspectives and respect the opinions of others. These qualities are essential ingredients not only within the school system but also for effective operation in the larger society. Organisations across the world need individuals who can collaborate with others to execute tasks and achieve the organisational goals. Thus, using group-based digital storytelling allows educational institutions to prepare efficient students, who would be employable after their educational pursuits. This could go a long way in reducing the level of unemployment in the society and position the youth for the challenges of this highly competitive world.

2.3.5 Individual-based digital storytelling and students' achievement in the classroom

Individual-based instruction affords teacher the opportunity to cater for students with various capabilities in the classroom and as well as learners with disabilities and other forms of learning challenges. The number of students with unique learning needs keeps on increasing across all levels of education and individualising instructional opportunities and learning content is an accepted practice for successful educational inclusion in different parts of the world. Students with differing disabilities could be well catered for with the capabilities of individualised educational opportunities that recognise their special needs at every level of their educational pursuits. These set of students, when allowed to participate in individualised instruction, would be able to have individual contact with the instructional content and learn at their different paces. This is the hallmark of individualised instruction in classroom practices. Appropriately individualised instruction usually results to meaningful learning for all students in the classroom, U.S. Department of Education (2005). Studies have been carried out across the world to determine the appropriateness of individualised instruction to improve students' achievement in different area of disciplines.

Hamilton (2010) observed that there was a significant influence of individualised learning strategy on students' achievement in chemistry in high schools, when compared with students in the control group. Najat Smeda, Eva and Sharda (2014) indicate that individualised digital storytelling promotes acquisition of skills and knowledge to develop students in all areas of endeavours. Findings from Ohler (2008) indicated that a significant percentage of teachers considered individualised digital storytelling as a valuable strategy that improved problem-solving skills and technological development. A number of instructional skills like writing, spelling, and searching skills could be adequately developed with individualised classroom instruction. In other words, the one-on-one interaction with technological tools improves technical skills of individual students in the classroom, as they would be able to study the content more deeply and learn at their own rates. These opportunities provided by individualised instruction make the strategy suitable for different categories of students with diverse learning need and styles. Some introverts would prefer not to be part of group task and individualised instruction would adequately support the learning style of this category of students in the classroom.

2.3.6 Individual-based digital storytelling and students' attitude to instruction

Digital storytelling could either be in group or individualised mode, depending the level of students, availability of resources, learning styles and many other factors. Individual-based digital storytelling can promote deep learning of the instructional content, sense of ownership in students, and stimulates students learning in the classroom. This mode can be employed to enhance learners' writing and searching competences. Individualised instruction gives flexibility to students' learning by allowing them to study at their own pace. It should be noted that students in the classrooms are of different abilities, learning needs and personalities and these traits need to be properly catered for by the teacher for effective classroom instruction. In his submission, Holli (2008) affirms that individualised instruction consists of any steps taken in conducting programmes of studies that suit students learning needs, learning readiness and learning styles in the classroom.

The University of Houston (2009) conducted studies examining the educational uses of DST. The study revealed that individualised form of digital storytelling had significant impact on learning outcomes and attitude to classroom activities. Jing (2016) conducted a one year research on some Chinese students to determine the impact of individualised storytelling on students' motivation to learn EFL in the faculty. Results showed that students who were taught using individualised digital storytelling showed improved motivation to EFL content-based instruction than students in the conventional mode of instruction. It is believed that when students have unrestricted access to the content, it motivates them to show positive disposition to learn and share their opinion with other members of the class anytime.

Sadik (2008) employed mixed method research design to explore the effect of DST on Egyptian students' learning in the classroom. Result revealed that individual students who interacted with digital stories at their own paces showed significant improvement in their level of engagement with the learning materials and scored good grades than students who were exposed to conventional method of teaching. One implication of Sadik (2008) study is that this individualised mode of digital storytelling could significantly improve students' communication skills, due to personal engagement with a topic of the story. This could afford students the opportunity to engage in effective interaction within and outside school settings. These findings are pointers to the fact that digital storytelling has significant influence on the learning outcomes of students. Digital storytelling promotes technological

skills, research skills, knowledge of the content, collaboration and teamwork among students in the classroom. It is imperative to note that these skills define the functionality of students in their future workplaces and modern society at large. It is, therefore, important that educators should leverage the capabilities of digital storytelling to equip students with requisite skills to function effectively in the 21st Century society.

2.3.7 Computer anxiety and students' achievement in classroom instruction

Computer anxiety is an important factor to be considered in 21st Century classroom activities as students face day-to-day challenge of using computers in executing tasks and implementing policies. Fear of failure, computer anxiety and inadequate ICT skills have been mentioned as some of the reasons for teachers' disinclination to integrate technological tools into teaching and learning activities (Balanskat, Blamire and Kafal, 2007). In a study carried out by (BECTA, 2004), it was reported that about 21% of the teachers who participated in the research, indicated that lack of confidence influenced their use of computers for instructional tasks. BECTA (2004) stated that many teachers who do not consider themselves to be well skilled in using ICT or computer-related gadgets feel nervous when using these devices in front of students, who possibly know more than they do. Raafat and Dennis (2009) affirm that the systematic adoption of technological devices and other digital tools sometimes has unfavourable consequences, including negative emotional status that come up even before actual interaction with computers or participation in computer-related tasks. Raafat and Dennis (2009) reported that anxiety in using computer had a significant impact on students' perceived ease of use of the LMS to execute instructional tasks.

Shaw and Giacquinta (2000) reported that students' computer anxiety had significant influence on students' achievement in the classroom after the experiment. Many studies across the world have indicated a significant connection between computer anxiety and some other variables such as age (Namlu and Ceyhan, 2002); frequency of computer use among students in the classroom (Necessary and Parish, 1996); computer experience of the users including teachers and students (Yaghi and Ghait, 2002); and individual's appraisal of computing situation in the society (Crable, Brodzinski, Scherer and Jones, 1994). Tsai and Tsai (2003) also reported a positive correlation between learners' meta-cognitive skills, ICT competence and computer anxiety after the experiment. Russell and Bradley (1998) in a study of computer anxiety among teachers in Australia indicated that in-service teachers' perception of

technology use has a direct relationship with individual's degree of computer anxiety and technological skills to use computer-related gadgets to engage students in classroom instruction.

2.3.8 Computer anxiety and students' attitude towards classroom instruction

In this 21st Century schooling system, computer anxiety remains an important factor that determines the success rate of students in classroom activities. The teaching-learning process is increasingly becoming technology-based and students need technological skills and knowledge to participate in computer related activities, whether students are currently using computers to learn or not. This has made the variable a relevant index to measure the success rate of students and teachers, regardless of the type of strategy adopted for classroom instruction. Computer anxiety level of students is considered as an important factor in integrating computer technology into instructional process. In the words of Russell and Bradley, (1997) the issue of computer anxiety has always existed in history naturally due to the individual inherent apprehensive tendencies towards new innovations and inventions in different strata of the society. Chua, Chen and Wong (1999) define the concept as distress expressed towards computers while using the tool or about to use it to execute tasks.

However, it is worth of note that a complete elimination of computer anxiety is practically impossible, but the identification of the levels of apprehension and strategies to reduce the fear are quite essential and significant to ensure effective educational process. Computer anxiety directly and indirectly influences an individual's choice of learning in the classroom and achieving a reasonable level of competency in computer-based tasks. Computer anxiety is likely to influence learners' activities in every classroom setting, whether conventional or technology based. The reason being that, todays' students live in a media saturated environment where technological knowledge and skills are important to function within and outside school premises. Isil (2015) affirmed that there was a negative relationship between students' degree of computer anxiety and the use of computers for instructional activities in and outside the school environment. The study showed that, as the duration of computer usage increased, students' computer self-efficacy increased and anxiety level decreased significantly.

In their study, Orr et al., (2001) examined the factors that could positively change attitude along several demographic indices. In summary: (a) the findings revealed that computer anxiety can be reduced through formal and hands-on computer

training; (b) computer anxiety had significant influence on learners learning outcomes in terms of attitude and performance in the instructional content; (c) the issue of age was considered not a significant factor that could affect computer use. This implies that computer anxiety could affect all categories of students and hands-on computer training practically reduces the level of anxiety and motivates students to use computers for instructional tasks. However, the rapid advancement in technology across the world could have negated part of this report as younger ones are now growing up in an environment surrounded by technological devices. These are the group of people that Prensky (2007) considered as digital natives and there is high probability that they use technology effectively to execute tasks that the older generation. Therefore, the third report could not be said to be applicable in this digital revolution era.

2.3.9 Perceived relevance and students' achievement in classroom instruction

The strategic importance of perceived relevance in motivation and interest had been documented in literature across different levels of education. Perceived relevance of a particular activity or exercise could help individuals make appropriate choice and be persistent in performing that task more frequently, Wigfield (2004). The readiness of individuals in the society to partake in an activity is largely a function of the value they place on such exercise and what really sustains human participation in an event is the perceived relevance attached to it. This natural disposition of human beings is usually being extended to the school setting as perceived relevance plays a pivotal role in determining and sustaining students' participation in classroom activities. Audrey and Choy (2015) indicated that students who specialised in marketing courses in most cases have positive perception of these courses and mostly outclassed non-marketing majors in the classroom. Some studies had also discovered that some students of marketing perceive the courses to be irrelevant as experience gained from marketing classroom cannot be used to solve students' problem in other areas of study (Hilton, Hughes and McDowell, 2007).

Evidences from studies revealed that achievement in instructional content is affected by the instructional strategies adopted by teachers in the classroom. These learning strategies are influenced by students' perceptions of the course. Positive perceptions commonly enhance deep learning and in turn promote higher academic performance of students in any instructional content, Jackling (2005). Generally, students with negative perceptions tend to adopt the surface learning approach to

classroom activities and this could negatively affect their performance (Prosser and Trigwell, 1999; Houghton, 2004). McPherson (1998) discovered that students' perception of the relevance of course content to their professional career development determines, to some extent, the level of attention to learning course materials or executing instructional tasks.

Previous studies within the work-integrated learning literature have identified students' perceived relevance between tertiary education instructional content and future workplaces to be an important factor in understanding their enjoyment, satisfaction and commitment to the learning experience (Wiseman and Page, 2001; Drewery, Pretti, and Pennaforte, 2015). This finding suggests that learning experiences which are perceived by students to be highly relevant in terms of connecting to academic pursuits and workplace requirements are more likely to improve students' performance in co-operative studies in higher education. Hernandez (2003), believe that students' learning could improve significantly, if the instructional content is presented within context they can relate to, for easy understanding and applicability.

Students would be able to communicate ideas and share opinions effectively, if the course content is placed in context and it is relevant to allow for meaningful interaction to take place in the classroom. As such, there is a strong link between students' perceived relevance and academic performance in marketing courses at the university level of education. When students perceive instructional content and method to be relevant to their present and future use, teacher has lesser work to do in engaging them in classroom instruction. In other words, students naturally develop interest in the course content that equips them with knowledge and capabilities to solve problems in the subject and excel in other areas of study.

2.3.10 Perceived relevance and students' attitude to classroom instruction

The concept of perceived relevance has been well debated in academic community, as many scholars believed that there exist a nexus between learning outcomes and students' perceived relevance of a particular subject. Student's attitude to a course content could be significantly altered by perceived relevance. Pintrich and Zuscho (2007) affirmed that "if students in the classroom consider the course content as being relevant to their present needs or future career development, then they would be more motivated to study the materials, which could result in improved attitude to the subject". Students have diverse projections and intentions for enrolling in a particular

course and if the content is perceived not relevant to these projections, students are not likely to be actively engaged in the task and may, in the long run, lose interest in the course.

Ho and Hong (2008) characterise instructional process into motivating and demotivating environments by considering the relevance of the content delivered to students in the classroom setting. In the first phase of the experiment, it was discovered that concepts that were abstract in nature were found to demotivate student learning due to low perceived relevance in such learning content. On the other hand, course content that promoted applicability of instruction or learning materials, identified relevance of concept, and pointed out relevance of the classroom tasks to societal issues could motivate learners to actively learn the instructional content. The implication of this report is that when teachers present instructional content in abstract format, it makes learning less real and learners might find it difficult to establish practical connections between classroom activities and happenings in the society. Therefore, it is necessary for teachers to use strategies and tools that would make classroom instruction connected to real life situation. This would improve learners' perceived relevance of the course and they would be motivated to pay attention to the details of the instructional content.

Findings from (Susanna and Andrew, 2011) showed that the faculty participants' perceived relevance had significant influence on the curriculum content and acquisition of skills and knowledge in the classroom instruction. Osborne et al. (2003) identified students' perceived relevance of science subjects to have significant influence on their attitude and achievement in the subjects. In other words, the way students perceive a particular science subject as having the capabilities to help them execute task in and outside the classroom determines their attitude to such a course at different levels of education. Also, Al-Gharibi (2008) found out that many students perceived social studies lessons as enjoyable and interesting to learn and therefore showed positive attitude to the subject.

Students' perceived relevance of their current learning environment and instructional content had been found to be stronger predictors of learning outcomes among university undergraduate students, (Alf, Keithia and Roland, 2002). Also, Tomal (2004) found out that an important factor that made students dislike map reading was the kind of perception they had about the subject. Majority of geography students from the interviews and observation believed that the concept would

contribute nothing to their future career development and relevance. They therefore considered map reading as a concept that was not relevant to their well-being and functionality in the society. It is therefore important that geography teachers make map reading quite interesting and realistic to the students, by using appropriate teaching strategy and tools that would reduce the level of abstractness in the concept. This would improve learners' perceived relevance of map reading to solve their problems, now and in the future.

2.4 Appraisal of the literature

With the availability of digital tools in modern learning space, digital storytelling is at the threshold of becoming an essential transformative technology-supported strategy, to actively engage learners with diverse abilities in classroom activities and promote students' critical thinking skills. In different parts of the world, especially in developed countries, scholars have examined the effectiveness of digital storytelling in promoting learning outcomes across all levels of education. Different modes of DST had been employed to engage learners in classroom activities. Also, a relatively few studies had been conducted in Nigeria on the use of digital storytelling for instructional delivery.

However, the efficacy of DST on geography students' attitude and achievement in map reading had not been properly examined to demystify the concept and make it more connected to real life situation. No study had been conducted in Nigeria to determine the effectiveness of digital storytelling in enriching classroom instruction and improving learning outcomes in map reading at the senior secondary school level. Literature has shown that digital storytelling has the capabilities to reduce the level of abstractness in instructional delivery and make learning more realistic to the students. In other words, the appropriate use of digital storytelling in classroom activities could help geography teachers overcome the inherent challenges associated with the teaching and learning of map reading at the senior secondary school level. While students watch digital stories, the power of storytelling and the capabilities of media usually stimulate learning and along the line, students are able to give attention to the details of the instructional content. This is why many scholars believe that digital storytelling allows students to learn without realising. There is no particular strategy that could effectively cater for the diverse needs of students in the classroom, thus, digital storytelling remains a veritable supporting strategy that could be integrated into classroom instruction to complement direct method of teaching.

Learners' computer anxiety and perceived relevance are important factors that could undermine content delivery in the classroom. Computer anxiety is the fear or uneasiness that individual exhibits when confronted with the challenge of using or participating in computer-related activities. Also, perceived relevance is the way students consider a particular concept or subject as being relevance to their learning process and future workplaces. Scholars have examined the moderating effects of these variables on students' learning outcomes across the world. Perceived relevance had been found to be an important factor in determining students' level of participation and commitment to classroom activities in subjects like biology, mathematics, physics and geography. However, the moderating effects of these important variables in determining students' learning outcomes in map reading had not been properly examined in literature. These are the gaps in literature that are yet to be filled by scholars at all levels of education. Therefore, this study was carried out to develop a digital storytelling package and determined its impacts on students' learning outcomes in map reading in Ibadan metropolis, Nigeria.

CHAPTER THREE
METHODOLOGY

The research design adopted and selection of participants for the study are discussed in this chapter. Other items include: variables in the study, research instruments, validation of the instruments, procedure for the study and method of data analysis.

3.1 Research design

Mixed method design was adopted for the study given that it was carried out in stages to generate qualitative and quantitative data. Quantitative data was generated from questionnaires while focus group discussion and in-depth interview were held with geography students and teachers respectively to produce qualitative data for the study. The experiment was carried out in two stages. Stage one had to do with the development of digital storytelling package while stage two was the delivery stage when senior secondary school II geography students were exposed to the digital storytelling package and students in the control group were taught using conventional strategy.

Stage one

This had to do with the development of digital storytelling package to facilitate instructional delivery in map reading classroom.

Stage two: This was the implementation stage where digital storytelling package was used on senior secondary school geography students. The pretest-posttest control group quasi-experimental design was adopted.

O_1 X_1 O_2

O_3 X_2 O_4

O_5 X_3 O_6

X_1 represents group-based digital storytelling mode

X_2 represents individual-based digital storytelling mode

X_3 represents conventional strategy

O_1, O_3 and O_5 are pretest measures for experimental and control groups.

O_2, O_4 and O_6 are posttest measures for experimental and control groups.

The study employed a 3 x 3 x 3 Factorial Matrix, which is presented on Table 3.1.

Table 3.1. 3 x 3x 3 Factorial matrix of the study

Treatment	**Perceived Relevance**	**Computer Anxiety**		
		High	Medium	Low
Group-Based Digital Storytelling	High			
	Medium			
	Low			
Individual-Based Digital Storytelling	High			
	Medium			
	Low			
Conventional Teaching Strategy	High			
	Medium			
	Low			

3.2 Variables in the study

The following variables are in the study:

1. Independent variable: This is teaching strategy at three levels:

a. Group-Based Digital Storytelling Mode

b. Individual-Based Digital Storytelling Mode

c. Conventional Teaching Strategy

2. Moderator variables: There are two moderator variables in the study. These are:

a. Computer anxiety at three levels : High, Medium and Low

b. Perceived Relevance at three levels: High, Medium and Low

3. Dependent variables: These are :

a. Achievement in Map Reading

b. Attitude to Map Reading

3.3 Selection of participants

Three senior secondary schools were purposively selected to participate in the study within Ibadan metropolis. The criteria for the purposive selection of the schools in the experimental groups were as follows:

(i) Availability of geography teacher and geography students in the school.

(ii) Availability of functional computers to deliver the instruction.

(iii) Availability of alternative power supply in case of power outage.

(iv) Readiness and willingness of the school to participate in the study.

At this point, it is important to state that proximity of the secondary schools that met the criteria was considered before selecting the three schools for the study. Therefore, the schools selected were not too close to one another, to ensure that the outcome of the research was not influenced by the interaction of the participants.

Also, 506 students from the three schools were assigned to group-based digital storytelling (242), individual-based digital storytelling (138) and control (126) groups. In other words, all the geography students in the three schools were used for the study to ensure that no student was inadvertently denied the opportunity of learning map reading with digital storytelling strategy.

3.4 Report of baseline study

In an attempt to examine the challenges with the teaching and learning of map reading in Nigerian secondary schools, a baseline study was carried out to identify difficult topics in this aspect of geography with the conventional method being used by the teachers. A total of 462 senior secondary school II geography students and 78 geography teachers were randomly selected from five states (Lagos, Oyo, Ondo, Ogun and Ekiti States) in south-west Nigeria. Since the WAEC chief examiners reports mostly centered on the inability of the candidates to identify and interpret features on the topographical map, topics in map reading that require students to identify, represent and interpret features using contour lines and other map symbols, were selected from SS II geography curriculum. The results showed that six sub-topics were identified as being difficult by both teachers and students and these are:

(i) Identification of features on topographical map (Valley)
(ii) Identification of features on topographical map (Spur)
(iii) Identification of features on topographical map (Ridges)
(iv) Methods of representing relief on topographical map (Contour)
(v) Representation of river and its direction of flow
(vi) Inter-visibility

3.5 Research instruments

Eleven research instruments were used for the study and they were categorised into measuring or response instruments, stimulus instruments and assessment checklists.

A. Response Instruments comprise:
(i) Map Reading Achievement Test (MRAT)
(ii) Questionnaire on Student' Attitude towards Map Reading (QSAMR)
(iii) Computer Anxiety Questionnaire (CAQ)
(iv) Questionnaire on Students' Perceived Relevance of Map Reading (QSPRMR)

B. Stimulus instruments include:
(i) Teacher's Guide for Group-Based Digital storytelling
(ii) Teacher's Guide for Individual-Based Digital storytelling
(iii) Teacher's Guide for Conventional Strategy
(iv) In-depth Interview Guide (IIG) for Geography teachers
(v) Focus Group Discussion Guide (FGDG) for secondary school Geography students
(vi) Digital Storytelling Package (DSP)

C. Assessment Checklist

(i) Rubric for Evaluation of Digital Storytelling (REDST)

3.5.1 Map Reading Achievement Test (MRAT)

The test consists of sections A and B. Section A includes the background information on students while section B comprises twenty-five multiple choice questions. These questions were drawn from the six perceived difficult topics identified in the baseline study carried out by the researcher. The test was given to geography teachers and other experts in the field of geography for face and content validity. Kuder-Richardson (K-R 21) was used to test for the level of difficulty and reliability index of 0.80 was obtained.

Table 3.2. Table of Specification for Map Reading Achievement Test

Topics	Remembering	Understanding	Applying	Analysing	Evaluating	Creating	Total
Identification of features(Valley)	2 Items (1, 20)				1 Item (18)		3
Identification of features (Spur)	1 Item (7)	1 Item (25)					2
Identification of features(Ridges)					1 Item (16)	1 Item (14).	2
Methods of representing relief (Contour)	3 Items (2,3,9)	2 Items (4,5)	1 Item) (13)	2 Items (23, 24)			8
Representation of river	1 Item (8)	1 Items (11)			2 Items (6, 22)		4
Intervisibility	1 Item (10).	2 Items (19,21).	1 Item (17)		2 Items (12,15).		6
Total	8	6	2	2	5	2	
	Total Items						25

3.5.2 Questionnaire on Students' Attitude towards Map Reading (QSAMR)

Questionnaire on attitude towards map reading was designed to examine attitudinal disposition of senior secondary school geography students to map reading. It comprises fifteen items measured on a four Likert type scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). To ensure that the items in the instrument are consistently reliable, the questionnaire was administered to twenty respondents who were not part of the main study. The data was analysed using Cronbach Alpha and reliability coefficient of 0.75 was obtained to show that the instrument was reliable.

3.5.3 Computer Anxiety Questionnaire (CAQ)

This questionnaire was used to examine the issue of computer anxiety in senior secondary school geography students. It contains fourteen items to measure the level of computer anxiety and how this moderator variable could determine the use of computer related technologies for learning purpose. Both face and content validity of the instrument were carried out with the assistance of Educational Technologists. The instrument was administered to twenty respondents who were not part of the study to determine its level of reliability. The reliability index of 0.78 was obtained through Cronbach Alpha.

3.5.4 Questionnaire on Students' Perceived Relevance of Map Reading (QSPRMR)

This instrument was designed to measure geography students' perceived relevance of map reading to their understanding of geographical phenomena in their immediate environments. It consists of ten items measured on a four Likert type scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). Both face and content validity of the instrument were carried out with the assistance of Educational Technologists. To ensure that the items in the instrument are consistently reliable, the questionnaire was administered to twenty respondents who were not part of the main study. The data was analysed using Cronbach Alpha and reliability coefficient of 0.82 was obtained.

3.5.5 Teacher's Guide for Group-Based Digital Storytelling (TGGDST)

This is an instructional guide for geography teachers to effectively deliver lessons through group-based digital storytelling. Since digital storytelling is a supporting strategy to complement conventional teaching delivery mode, this template afforded

geography teachers the opportunity to seamlessly introduce digital storytelling in the classroom. This guide allowed teachers to effectively organise the students and materials in group-based digital storytelling classroom. Also, teachers were able to identify the appropriate stage at which students should be exposed to the content of the digital storytelling package. The major headings in the template include: class, population, duration, topic, instructional objectives, story circle, introduction, dramatic question, presentation of content, feedback, summary and evaluation. The guide was validated by some Educational Technology lecturers and post-graduate students in Educational Technology Unit, University of Ibadan as well as the project supervisor. Comments and corrections were effected and its inter-rater reliability was estimated using Scott's π. The inter-rater reliability index obtained was 0.80.

3.5.6 Teacher's Guide for Individual-Based Digital Storytelling (TGIDST)

This guide was designed to assist geography teachers to deliver individualised digital storytelling strategy in the map reading classroom. With the use of this instrument, teachers were able to give out the content ahead of the class and also coordinated class activities during instructional delivery. The major headings in the instructional guide include: class, population, duration, topic, instructional objectives, preparation stage, introduction, dramatic question, presentation of content, feedback, summary and evaluation. The guide was validated by some Educational Technology lecturers and post-graduate students in Educational Technology Unit, University of Ibadan as well as the project supervisor. Comments and corrections were effected and its inter-rater reliability was estimated using Scott's π. The inter-rater reliability index obtained was 0.79.

3.5.7 Teacher's Guide for Conventional Strategy (TGCS)

This instrument was used to teach students in the control group. It consisted of six lessons each of which had four steps including introduction, presentation, conclusion and summary. The inter-rater reliability was estimated using Scott's π and the reliability index obtained was 0.76 which showed that the instrument was reliable.

3.5.8 In-depth Interview Guide (IIG) for Geography Teachers

The in-depth interview guide was used to seek opinions of the in-service geography teachers on the challenges and benefits of using digital storytelling for classroom instruction. The instrument allowed geography teachers to share their experience on the constraints they encountered in using digital storytelling package for teaching map

reading as well as instructional benefits that are derivable from using this strategy for classroom instruction.

3.5.9 Focus Group Discussion Guide (FGDG) for Secondary School Students

This instrument was used to generate qualitative data from the senior secondary school geography students on their experience from using digital storytelling to learn map reading. This allowed students to share their opinions on the lessons learnt and the benefits of using this tool for map reading activities.

3.5.10 Digital Storytelling Package

This package was specifically developed by the researcher to teach difficult topics in map reading at the senior secondary school level. The package contains local videos and pictures that explain difficult topics in map reading, such that students would be able to relate what they learn in the classroom to the landforms in their immediate environments. The package begins with instructional objectives and dramatic question before students are exposed to the content of the story. There are class activities within the stories to engender active engagement and full concentration during instructional delivery.

Table 3.3. Procedure in creating digital storytelling package

Steps in Creating DST	**Description**	**Researcher's Tasks**
Script Writing	Stories were created around the difficult topics in such a way that the curriculum contents to be learnt by the students are well captured by the stories	Creating stories around difficult topics in map reading in such a way the content is well captured by the stories. The scripts were given to experts for necessary comments and feedback.
Storyboarding	Storyboard template is a graphic organizer that allows storytellers to visualise the combination of all elements of story creation before actually deploying any digital tools.	The storyboards were designed to depict the media elements to be used in creating the stories before using technology.
Search for Materials and Organising Folders	If the media elements are not kept together appropriately, it becomes difficult for students or teachers to locate the materials at the point of importing them for editing.	Folders were created on the desktop for the purpose of keeping the materials for the project. Short local videos were shot to tell the stories and appropriate pictures were selected.
Introduce Digital Tools.	This is where story was mixed with technology to produce the instructional package.	For the purpose of this project, Camtasia software was used to edit the media elements while VideoScribe software was used to insert class activities within the content.
Creating the Voiceover	The sound is an essential element in digital storytelling as it directs the pace of other components that are used in the exercise.	Creating the voiceover using audacity software and the audio was later exported to the Camtasia studio for editing
Save the Project and Publish	The project needs to be properly saved on the system for easy retrieval.	The project was saved on the desktop in mp4 format so that it could be played on computers or mobile phones.

Peer Review and Feedback	It is important at this point to share the stories with experts and teachers. This allowed cross-fertilization of ideas to make the package better.	Educational technologists, geography teachers and students were allowed to watch the stories and they all made useful comments and suggestions to make the instructional package more engaging. This was done through validation of the package.
Presentation in the General Class	In order to pay due respect to the storytellers, it is worth putting on a show. Storytellers should be offered the chance to say something about their films before being screened.	Educational technologists in the unit were invited to witness the presentation and critique the package. Their comments and corrections were effected to produce the final prototype of the package.
Evaluation	Scholars have argued that rubric remains the best instrument to evaluate the content of a digital storytelling package.	DSTER was given to the assessors to grade the quality of the content.

3.6 Validation of digital storytelling package

Creating digital story for classroom instruction requires strict adherence to the laid than principles, if its objectives in education would be realised. The curriculum content should be well embedded in the package, such that, while students are listening to the story, they are also learning what the curriculum specifies that they should learn in the classroom. Therefore, in creating the stories, a systematic procedure of activities was followed to ensure that all digital storytelling elements were incorporated in the instructional package. This procedure was followed to produce the first prototype of the digital story package. Digital stories were created around difficult topics in SS II map reading curriculum, with a view to solving the instructional problems identified in the background to the study.

Objectives of the digital storytelling package

Specifically, this digital storytelling package was developed to achieve the following objectives:

(i) To demystify difficult topics in map reading.

(ii) To significantly improve students' achievement in map reading.

(iii) To positively improve students' attitude towards map reading.

(iv) To afford teachers the opportunity of understanding the benefits derivable from using technology for instructional delivery.

(v) To afford the teacher the opportunity to actively engage learners classroom activities.

(vi) To provide a link between classroom instruction and learners' immediate environment.

(vii) To make map reading activities real and connected to real-life situation.

3.6.1 Development of prototype one of the digital storytelling package

This instructional package was designed to teach difficult topics in map reading in senior secondary school II curriculum. The laid down procedure for creating digital storytelling was followed in producing this instructional package. The process practically began by scriptwriting which incorporated the curriculum content in each topic. Stories were created around this curriculum content in each of the topics to ensure that the process would produce a complete package for classroom instruction. Local pictures and videos were used to narrate the stories. The first prototype of the package was produced and presented to some selected educational technologist for

feedback and comments. Basically, this first prototype was presented to technologists for comments on technical quality and appropriateness of media used for the package.

Feedback from educational technologists

As expected, the experts raised critical comments that needed to be addressed. The aggregates of their comments are summarized below:

1. They all agreed that introducing digital storytelling to classroom instruction would significantly improve instructional delivery at all levels of education.
2. Digital storytelling would make learning more interesting to the learners.
3. Issues were raised on the need to include class activities in the stories in such a way that while students are watching the content, they would also be expected to execute some learning tasks. It was agreed that this would make learners to be actively engaged in the classroom.
4. Some adjustments should be made on the videos to ensure that the videos properly narrate the story contents.
5. Some typographical errors needed to be corrected to ensure that students received the correct instruction and information.
6. Local pictures and videos should be used throughout the stories to make learning connected to real-life situation.
7. There were needs to add some call-outs to emphasise important points in the stories.
8. Some colours and soundtracks were distracting and needed to be removed.
9. Some of the slides were considered too wordy and needed to be replaced with pictures and videos.
10. In all, they all agreed that the package would go a long way in demystifying map reading and making it connected to students' environment.

Re-examining the problem

Based on these comments, necessary corrections were made to improve the quality of the package, so that, this technology intervention would have capabilities to solve the problems identified in the background to the study. The researcher searched for additional local pictures to replace foreign ones and produced more local videos to narrate the stories. At this point, it was also important to carry out proper editing of the text component to ensure error-free instructions and information. All these comments were properly examined and appropriate corrections were effected to produce the second prototype of the package.

3.6.2 Development of prototype two of the digital storytelling package

The second prototype was produced based on the comments and suggestions of experts on the technical quality and appropriateness of the media used in the package. Additional local pictures were made to make the content more real and connected to real life situation. Local geographical pictures were used in such a way that students were afforded the opportunity to identify pictures on the topographical map in their immediate environments. Instead of presenting the content on power point before capturing it with Camtasia, the Camtasia studio was used directly to capture all the media elements in the stories. This allowed the researcher to properly synchronize the voiceover with other media elements and with this, the text component greatly reduced.

To ensure active engagement throughout the content, the researcher incorporated class activities in the stories with the use of VideoScribe software. This was to ensure that learning process could be progressively monitored while students are being exposed to the content and as such, they would not be carried away by the media displays in the stories. At the end of this process, the second prototype was produced. At this point, it was important to validate both the technical quality and the appropriateness of digital storytelling package for classroom instruction. Therefore, this second prototype was presented to educational technologists, geography teachers and students at the secondary school level.

Feedback from the educational technologists

The respondents agreed this prototype was a significant improvement over the last sample. The use of VideoScribe software to insert class activities in the story was also commended. However, some of them believed that the transitions used were too complex and recommended the use of simple transitions like ‘ fade in’ and ‘ checkerboard’. It was also recommended that there was a need to streamline the use of soundtracks to indicate changes in the story content.

Feedback from the teachers and students

The aggregates of their comments are summarized below:

1. They showed interest in using the package for classroom instruction.
2. Both students and teachers believed that using digital storytelling for learning would make map reading more interesting and less difficult.
3. Some words used in the story were too difficult for students to understand.

4. The teachers expressed concerned about the availability of computers to use the package.

The researcher took note of all these comments and effected necessary corrections to produce the third prototype.

3.6.3 Development of prototype three of the digital storytelling package

To produce the final copy of the package, necessary corrections were effected, especially, in the areas of transitions and complex words. Simple transitions were used and some difficult words in the class activities were replaced. The audio component of the story was also enhanced to ensure clarity of the voice. These adjustments were made to ensure the production of a complete instructional package that could be used to solve the problems associated with the teaching and learning of map reading at the senior secondary school level. This third prototype was, thereafter, adopted for the implementation stage.

3.6.4 Evaluation of the package

Digital storytelling evaluation rubric was used to evaluate the package. The minimum and maximum points for the rubric are 10 and 40 respectively. Some educational technologists were selected to score the package with the rubric and the average score for the stories was 32 points which was considered appropriate for classroom instructions. This package was then pilot tested on some selected geography students in Oyo Town.

3.6.5 Report from the pilot study of digital storytelling package

In order to ensure smooth delivery at the implementation stage, a pilot study was carried out in a secondary school that was not part of the main study. The selected geography students were divided into two, to participate in both group-based and individualized modes of digital storytelling. Students in the group-based mode were divided into six story circles and they were allowed to watch the stories in groups. Students in individualised mode had the opportunity of watching the stories through their school computers, before the class.

3.6.6 Challenges from the pilot study

The following challenges were confronted and they were built into the main study to ensure minimum hitch at the implementation stage:

1. Many of the computers in some secondary schools were not in good working condition and the researcher needed to provide 3 laptops to complement the existing facilities. This challenge was built into the main study by ensuring that

only secondary schools with the required number of functional computers were selected for the study within Ibadan metropolis.

2. Power irregularity was also a challenge as the researcher needed to provide generator to facilitate the project. Therefore, only schools with functional computers and generator were selected for the study.
3. It was also discovered that some schools did not have geography teachers and some were no longer offering geography, since geography is now an optional subject at the senior secondary school level. Thus, schools that offered geography were selected for the main study.
4. Lastly, some students in the individualised digital storytelling group had difficulty in getting access to the computers at anytime, since many of these computers were not in good conditions. So, getting the stories across to them before the class became a daunting challenge.

3.6.7 Feedback from teachers and students

Semi-structured interview was conducted for both geography teachers and students to get their comments on the benefits and challenges in using digital storytelling strategy for instruction. The aggregate of their comments are summarized below:

1. The teachers considered digital storytelling as an effective strategy to engage learners in classroom instruction.
2. Students were interested in learning through digital storytelling as some of them commented that they would prefer to learn even other subjects with this strategy.
3. Many of these students believed that using digital storytelling could make map reading less difficult.
4. The teachers expressed concern about the availability of resources like computers and power to use this strategy for instructional delivery.
5. Some students commented that controlling the students in groups could be difficult.

In all, these challenges and feedback were properly considered and built into the main study to ensure hitch-free implementation at the delivery stage.

3.6.8 Rubric for evaluation of digital storytelling package (REDST)

The rubric contains ten criteria to evaluate the digital storytelling package produced, in order to measure the quality of the package. These criteria were used to measure both the technical quality and the appropriateness of the instructional content. Experts in the field of educational technology, geography teachers and students used this

instrument to evaluate the story content for the implementation stage. The minimum and maximum points for the rubric are 10 and 40 respectively, where 10-19 is below appropriate, 20-29 is average, and 30-40 is Appropriate. The instrument was given to the researcher's supervisor and educational technologists for face and content validity. This rubric was used to evaluate the third prototype of the package. Geography teachers used the rubric during the pilot testing to evaluate the package and reliability coefficient was 0.89, which indicated that the instructional package was reliable.

3.7 Procedure for the study

The secondary schools used for the study were visited with a view to getting approval and cooperation of school management, geography teachers and geography students who participated in the study. The procedure for the study across the two stages were as follows:

Stage one: This stage has to do with the development of digital storytelling package and a systematic procedure was followed in producing this instructional package, to ensure that the required curriculum content was incorporated. The procedure in Table 3.3 was followed to develop a digital storytelling package for map reading activities in the classroom.

3.7.1 Time plan for stage two of the study (Implementation Stage)

1st Week: Training of teachers on the rudiments of digital storytelling strategy and how to coordinate the classroom activities.

2nd Week: Administration of pre-test to the selected senior secondary school geography students. Pre-test on achievement in map reading was administered to the students in both control and experimental groups before the intervention.

3rd – 10th Week: Digital storytelling instructional delivery to both group-based and individualised modes. Students in the control group were also exposed to map reading content through conventional method.

11th-12th Week: Administration of post-tests to the geography students. Post-tests on students' attitude towards map reading, computer anxiety, perception of relevance and achievement in map reading were administered to the students in both control group and experimental groups after the intervention. In-depth interview and focus group discussion were conducted to obtain qualitative data from geography teachers and students respectively.

At the delivery stage, the digital storytelling instruction was implemented in two modes which are; group-based digital storytelling and individual-based digital

storytelling. In the group-based digital storytelling mode, geography students were divided into story circles and were allowed to interact with the package in the classroom. The individual-based digital storytelling mode allowed students to learn at their own pace. Under this mode, geography students were allowed to watch the stories 24hours to the class, especially during their free periods or after school hours, using computers in the schools. The idea is that this mode would allow students to watch the stories as many times as they desire. Generally, it had been recommended that digital stories should be moderately short (usually between 2 and 7 minutes) as this would allow students to watch many times at their own pace and sustain their interest throughout the content.

Table 3.4. Procedure for Group-Based DST classroom activities

Classroom Activities	**Description**	**Teacher's Tasks**	**Students' Tasks**
Demonstrating Competence in DST Pedagogy	Ability of teacher to create friendly classroom setting for seamlessly integrate DST in classroom activities.	The teacher creates relaxed atmosphere and friendly environment throughout the class by telling how they would learn different concepts in map reading through digital storytelling.	Students need to ensure that they comport themselves and follow teacher's instructions at every point.
Story Circle	Students need to be divided into sub-groups called story circles where they would be required to work together and take collective decisions	The geography teacher divides the class into story circles of five students each to promote collaboration and teamwork.	They appoint circle leader among members of the group to coordinate the activities within the group.
Dramatic Question	This question summaries the main point and could be answered after watching the content.	He/she presents the dramatic question to the students and allows them to think about it.	The students read the dramatic question and write it down to allow them give attention to the details and sustain their interests throughout the content.
Present the Content of the Story	Participants would be exposed to the digital stories to learn map	The teacher asks students to put on the system, locate the	Students boot the computer and locate the file that contains

	reading concepts in story forms.	story on the desktop and watch the content of the package in groups and discuss what they have learnt from the story.	the story on the desktop. As they view the story, they are to write down important points in their digital storytelling workbooks.
Execute Activities within the Story	Participants are exposed to instructional content and respond to the activities that are incorporated into the story.	The teacher asks students to respond to the activities in the story as they watch the content.	Students in different groups respond to the activities that are incorporated in the story and write down the answers in their workbooks.
Collaboration and Teamwork	Allow students to work together and take decisions collectively.	The teacher ensures that students work together and take decisions collectively.	Students share their opinions on the content of the story and collectively make meaning out of the content.
Evaluation and Feedback	Ascertaining the level of achievement of instructional objectives and response to dramatic question.	The teacher effectively evaluates all the instructional objectives and ensures that students are able to answer the dramatic question.	Students respond to the quiz at the end of the story and provide answer to the dramatic question.

Table 3.5 Procedure for Individual-Based DST classroom activities

Classroom Activities	**Description**	**Teacher's Tasks**	**Students' Tasks**
Individualised Digital Storytelling Instruction	Geography students would be allowed to watch the content of digital story individually before the class.	The teacher copies the story on school computers, at least 24hrs to the class to allow students watch the content before the class.	Students watch the story using the school computers before the class. As they view the story, they are to write down important points in their digital storytelling worksheet.
Execute Activities within the Story	Participants respond to the activities that are incorporated into the story.	The teacher asks students to respond to the activities in the story as they watch the content individually. Worksheet would be provided for each student to do this.	Individual student responds to the activities that are incorporated in the story and writes down the answers in the worksheet provided.
Demonstrating Competence in DST Pedagogy	Ability of teacher to create friendly classroom setting for seamlessly integrating DST in classroom activities.	The teacher creates relaxed atmosphere and friendly environment throughout the class by telling how they would learn different concepts in map reading through digital storytelling.	Students need to ensure that they comport themselves and follow teacher's instructions at every point.
Collaboration and Teamwork	Allow students to work together and discuss what they have watched before the class.	The teacher ensures that students do not watch the content in the class but rather discuss what they	Students share their opinions on the content of the story and discuss the

		have watched before the class.	activities in the story.
Evaluation and Feedback	Ascertaining the level of achievement of instructional objectives and response to dramatic question.	The teacher effectively evaluates all the instructional objectives at the end of the story and ensures that students are able to answer the dramatic question.	Students respond to the activities in the story and provide answer to the dramatic question.

3.8 Treatment procedure (Week 3-10)

The digital storytelling package on different topics in map reading was used to teach geography students at the senior secondary school level.

3.8.1 Experimental Group I (Group-Based Digital Storytelling)

This group was exposed to the group-based digital storytelling and the geography teachers employed the use of instructional guide on group-based digital storytelling strategy to present map reading content to the students. The steps involved in this guide are as follows:

Step I Story circle

Students are assigned into mixed ability groups (story circles) based on their performance in the last geography examination conducted by the school.

Students select circle leaders for each of the groups. Each group is made up of five to six members and each group has a computer to watch the package.

Step II Introduction

Teacher introduces the topic to the students on how they would learn the instructional content through digital storytelling.

Step III Students are informed to write down the dramatic question before watching the story.

Step IV Presentation of the content

Students are allowed to watch the story in groups and pay attention to the details of the content.

Step V Circle leaders are instructed to pause the video at every class activity to allow group members write down the activities.

Step VI At the end of the story, students discuss in story circles and execute the class activities within the story. The circle leaders are instructed to write down the aggregate opinions of the group members in the digital storytelling worksheets provided for each group.

Step VII Feedback

Circle leaders submit the worksheets to the geography teacher to ascertain how far students have learnt the instructional content. The teacher also repeats the dramatic question to determine if students would be able to answer the question.

Step VIII Summary and Evaluation: Teacher responds to students' questions and provides additional information on the topic. The teacher also asks students to answer the dramatic question that was posed at the beginning of the story.

3.8.2 Experimental Group II (Individual-Based Digital Storytelling)

This group was exposed to the individualised digital storytelling and the geography teachers employed the use of instructional guide on individualised digital storytelling strategy to present map reading content to the selected students. The steps involved in this guide are as follows:

Step I Preparation stage

Students have individual access to the digital storytelling package at least 24hrs to the class through school computers.

Step II Students are instructed to write down the dramatic question and executed the class activities individually at their own pace in the digital storytelling worksheet provided.

Step III Introduction

In the class, students discuss what they have watched before the class. It was a whole class discussion and members of the class interacted and discussed the content of the story.

Step IV Teaching phase

Students are given additional information by the teacher after class discussion.

Step V Feedback

Students submit their worksheets to ascertain how far they have learnt the instructional content.

Step VI Summary and Evaluation

Teacher responds to students' questions and provides additional information on the topic.

Students answer the dramatic question that was posed at the beginning of the story.

3.8.3 Control Group (Direct Teaching Method)

Senior secondary school students in the control group were exposed to the same content as the participants in the treatment groups using direct teaching strategy. The steps involved were as follows:

The teacher:

(i) asks questions on the last topic to ascertain students' entry behaviour.

(ii) introduces the topic to the students.

(iii) gives detailed facts or information on the topic.

(iv) gives note on the topic and uses instructional materials like topographical map to convey the instructional content.

(v) concludes the lesson by asking questions on the topic to ascertain how far students have learnt the instructional content.

(vi) gives assignment to students to prepare them for the next map reading class.

3.9 Method of data analysis

Data were analyzed using descriptive and inferential statistics. In descriptive statistics, frequency count, percentages, standard deviation and mean score were used to analyse the demographical information of the participants. Analysis of Covariance and Estimated Marginal Means were also used as inferential statistical tools. The qualitative data was content analysed. The level of decision was 0.05 level of significance.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

The findings obtained were analysed and discussed in order to provide answers to the research questions and hypotheses raised.

4.1 Answers to the Research Questions

4.1.1 Research Question One: What are the benefits derivable from using digital storytelling for classroom instruction?

Focus group discussion and in-depth interview guides were used to obtain qualitative information from geography students and teachers respectively on the benefits that are derivable from the use of digital storytelling for instructional delivery. On the part of geography teachers, many of them commented that digital storytelling made teaching less difficult especially in describing some abstract concepts in map reading. The teachers believed that this strategy made learning more real as teachers were able to relate classroom instruction with landforms in students' immediate environment.

One of the teachers specifically commented that "*the major benefit that geography teacher could gain from using digital storytelling is in the area of relating the features on the topographical map to the features in learners' local community".* This comment could be due to the efficacy of local videos that were used for the package. This instructional package was embedded with local video of secondary school student exploring his environment to properly understand the features on the topographical map. The teachers further reiterated that digital storytelling made learning more interesting to the students. This is well corroborated by Kotluk and Kocakaya (2015), Karakoyun, Kocakaya and Kotluk (2016), Kocakaya and Kotluk (2016) in their studies that the integrating DST into Physics classroom instruction have positive impact on trainee teachers' functional capabilities like problem solving, creativity, critical thinking, intra personal and inter personal relationships, which eventually resulted to improved attitude, motivation and interest toward Physics and other science-related subjects.

One of the teachers affirmed that "this teaching strategy produced a lively and participatory classroom interaction". One intriguing comment was made by a teacher that "*this strategy improved the level of students' engagement in map reading activities, as they were able to pay close attention to the details of the instructional package"*. This could not be unconnected with the power of class activities that were incorporated into the package as this engendered active participation of students in

classroom activities. This is in line with Barrett's (2006) assertion that digital storytelling combines students' level of engagement and integration of digital tools into instructional practices, which are student-centred learning approaches and are effective in engaging students in instructional content. Thus, the teachers concluded that digital storytelling could make classroom activities more interesting and allow students to learn with technology, which is part of their daily activities. With great excitement, one teacher commented "yes, this method greatly contributed to the accomplishment of the objectives of teaching in the classroom".

Geography students commented that digital storytelling had encouraged them to attend geography classes. One group specifically affirmed that "*this strategy motivated them to 'stay' in geography class"*. In other words, digital storytelling motivates students to effectively participate in classroom activities. Students believed that the strategy has equipped them with necessary skills to identify different features on the topographical map and that map reading became more interesting with digital storytelling. Students also believed that they could understand and identify features in their immediate environments after classroom instruction. Students further reiterated that digital storytelling allowed them to properly understand the fact that features on the topographical map could be found in students' local community. Therefore, geography students concluded that map reading became less abstract with the use of digital storytelling for instructional delivery. Other comments include: improved ability to use contour lines to identify features on topographical map, and that digital storytelling improved critical thinking.

4.1.2 Research Question Two: What are the major challenges faced by Geography teachers and students in using digital storytelling for classroom instruction?

In-depth interview and focus group discussion guides were used to obtain qualitative information from geography teachers and students respectively on the challenges faced in using digital storytelling for map reading activities. Geography teachers mainly commented that using digital storytelling for instructional delivery could be time consuming, if not properly planned. One teacher remarked that *"this strategy requires teachers to be efficient time managers, if the objectives of the lesson would be realised".* Generally, all the teachers noted that epileptic power supply could be a major hindrance to the effective use of digital storytelling for instructional delivery. They commented that it would be difficult for them to bear the cost of fueling generator for every map reading class. One teacher affirmed that "*using this strategy*

could be difficult unless regular electricity supply could be maintained in the school". In the same vein, geography teachers commented on the need to train teachers on the skills in designing and developing digital storytelling package for classroom instruction. They believed that many teachers are inadequately prepared to take up digital tools to develop digital storytelling package and therefore recommended regular training and workshops for teachers to ensure sustainability in using the strategy.

On the part of the students, they remarked that many of them were scared of using computers for classroom instruction. Classroom observation during the experiment revealed this anxiety in many students, as they sometimes hesitated to use computer for classroom activities. This challenge was commonly found with the students in the individualised group as many of them were not familiar with the use of computer for instructional delivery. Students in the group-based mode noted that some of them were slow learners and could not learn at the same pace with other members of the group. They therefore decided to watch the package more than three times for every member to understand and this consumed lot of time.

4.1.3 Research Question Three: Do Geography teachers and students embrace digital storytelling to support classroom instruction?

Students engaged in focus group discussion to examine the level of acceptance and their experience in using digital storytelling for classroom activities, while in-depth interview guide was used to obtain qualitative information from geography teachers on their experience in using this strategy to teach map reading. The students noted that they have learnt to pay detailed attention to classroom activities because digital storytelling required them to listen carefully to the instructional content and make meaning out of it. One group wrote "*this package taught students to be good listeners and concentrate on the class activities at all times*". Another group remarked that "*digital storytelling encouraged geography students to move round the community and see the natural landforms as they appear on the earth surface*". In other words, digital storytelling combines the power of storytelling and capabilities of media to equip students with knowledge to relate classroom activities with the landforms in the community.

Students have also learnt that there are other effective ways of learning map reading rather than the talk and chalk method usually employed by most geography teachers in secondary schools. Their comments indicated that they accepted and

embraced the use of this strategy for map reading activities. One group asserted that "*we agree that digital storytelling should be used to teach all aspects of geography*". These comments could be due to the capabilities of media in digital storytelling to engage students in classroom activities and ensure proper attention to the details of instructional content. Also, students commented that using this strategy to learn map reading, they have been able to conclude that features on the map are the landforms in students' immediate environment. Other comments from the students include: this strategy promotes interaction in the classroom, students have learnt to be tolerant and confident. On the part of the teachers, they commented that digital storytelling should be used to engage students in all subject areas. One teacher wrote "*I have come to a reasonable conclusion that digital storytelling should be employed by every teacher to motivate students to learn better in the classroom*". They also believed that this strategy has exposed them to technique of relating classroom activities with learners' immediate environment.

4.2 Testing of Null Hypotheses

H_o1a: There is no significant main effect of treatment on SS II geography students' achievement in map reading.

Table 4.1. Analysis of Covariance (ANCOVA) of post-achievement by treatment, computer anxiety and perceived relevance

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	10341.488[a]	18	574.527	93.850	0.000	0.776
Intercept	6061.000	1	6061.000	990.076	0.000	0.670
PreAchievement	1.115	1	1.115	.182	0.670	0.000
Treatment	1607.276	2	803.638	131.276	0.000*	0.350
Computer anxiety	34.766	2	17.383	2.840	0.059	0.012
Perceived relevance	8.038	2	4.019	.657	0.519	0.003
Treatment x Computer anxiety	2.650	3	0.883	.144	0.933	0.001
Treatment x Perceived relevance	3.871	2	1.936	.316	0.729	0.001
Computer anxiety x Perceived relevance	45.619	4	11.405	1.863	0.116	0.015
Treatment x Computer anxiety x Perceived relevance	9.129	2	4.564	.746	0.475	0.003
Error	2981.294	487	6.122			
Total	137288.000	506				
Corrected Total	13322.783	505				

R Squared = 0.776 (Adjusted R Squared = .768) * denotes significance at $p<0.05$

Table 4.1 showed that there was significant main effect of treatment on SS II geography students' achievement in map reading ($F_{(2, 487)} = 131.276$; $p<0.05$, partial $\eta^2 = 0.350$). The effect size is 35.0%. This means that there was a significant difference in the mean post-achievement scores of SS II geography students in map reading. Thus, hypothesis 1a was rejected. In order to determine the magnitude of the significant main effect across treatment groups, the estimated marginal means of the treatment groups was carried out and the result is presented in Table 4.2

Table 4.2. Estimated marginal means for post-achievement by treatment and control group

Treatment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Group Based (GB)	18.45	0.258	17.942	18.956
Individualised Group (IG)	17.20	0.388	16.438	17.964
Control Group (CG)	7.65	0.471	6.723	8.573

Table 4.2 revealed that SS II geography students in Group-Based (GB) treatment Group I had the highest adjusted post-achievement mean score (18.45), followed by Individualised Group (IG) treatment Group II (17.20), while the Control Group (CG) had the least adjusted post-achievement mean score (7.65). This order is represented as GB > IG < CS.

Table 4.3 Bonferroni post-hoc analysis of post-achievement by treatment and control group

(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference[d]	
					Lower Bound	Upper Bound
Group Based	Individualised Group	1.248*	0.466	0.023	.128	2.368
	Control Group	10.801*	0.537	0.000	9.511	12.091
Individualised Group	Group Based	-1.248*	0.466	0.023	-2.368	-.128
	Control Group	9.553*	0.611	0.000	8.085	11.021
Control Group	Group Based	-10.801*	0.537	0.000	-12.091	-9.511
	Individualised Group	-9.553*	0.611	0.000	-11.021	-8.085

Table 4.3 revealed that the post-achievement score in map reading of SS II geography students exposed to Group-Based (GB) mode were significantly different from their counterparts taught using Individualised Group (IG) mode and Control Group (CS). Furthermore, SS II geography students taught using individualised strategy post-

achievement score was significantly different from those exposed to control strategy. This implies that group based and individaualised strategies were the main sources of significant differences in treatment.

H_o1b: There is no significant main effect of treatment on SS II geography students' attitude towards map reading.

Table 4.4. Analysis of Covariance (ANCOVA) of post-attitude by treatment, computer anxiety and perceived relevance

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	24865.645[a]	18	1381.425	46.096	0.000	.630
Intercept	25538.722	1	25538.722	852.190	0.000	.636
PreAttitude	97.497	1	97.497	3.253	0.072	.007
Treatment	3794.173	2	1897.087	63.303	0.000*	.206
Computer anxiety	71.882	2	35.941	1.199	0.302	.005
Perceived relevance	14.012	2	7.006	0.234	0.792	.001
Treatment * Computer anxiety	129.033	3	43.011	1.435	0.232	.009
Treatment * Perceived relevance	38.852	2	19.426	0.648	0.523	.003
Computer anxiety * Perceived relevance	319.777	4	79.944	2.668	0.032*	.021
Treatment * Computer anxiety * Perceived relevance	28.075	6	14.038	0.468	.626	.002
Error	14594.576	487	29.968			
Total	1107398.000	506				
Corrected Total	39460.221	505				

R Squared = .630 (Adjusted R Squared = .616) * denotes significance at p<0.05

Table 4.4 showed that there was a significant main effect of treatment on SS II geography students' attitude towards map reading ($F_{(2, 487)} = 63.303$; $p<0.05$, partial $\eta^2 = 0.206$). The effect size was 20.6%. This means that there was a significant

difference in the post-attitudinal mean scores of SS II geography students to map reading. Thus, hypothesis 1b was rejected. In order to determine the magnitude of the significant main effect across treatment groups, the estimated marginal means of the treatment groups was carried out and the result is presented in Table 4.5

Table 4.5. Estimated Marginal Means for post-attitude by treatment and control group

Treatment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Group Based (GB)	50.18	0.572	49.055	51.304
Individualised Group (IG)	49.87	0.859	48.186	51.561
Control Group (CG)	34.63	1.040	32.585	36.670

Table 4.5 revealed that SS II geography students in Group based (GB) treatment Group 1 had the highest adjusted post-attitude mean score (50.18), followed by Individualised Group (IG) treatment Group II (49.87), while the Control Group (CG) had the least adjusted mean score (34.63). This order is represented as GB > IG < CS.

Table 4.6. Bonferroni post-hoc analysis of post-attitude by treatment and control group

(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Group Based	Individualised Group	0.306	1.033	1.000	-2.177	2.788
	Control Group	15.552*	1.189	0.000	12.695	18.409
Individualised Group	Group Based	-0.306	1.033	1.000	-2.788	2.177
	Control Group	15.246*	1.347	0.000	12.010	18.482
Control Group	Group Based	-15.552*	1.189	0.000	-18.409	-12.695
	Individualised Group	-15.246*	1.347	0.000	-18.482	-12.010

Table 4.6 revealed that the post-attitude towards map reading score of SS II geography students exposed to Group-Based (GB) was not significantly different from their counterparts taught using Individualised Group (IG) but significantly differs from those exposed to the Control Group (CS). Furthermore, SS II geography students taught using individualised strategy post-attitudinal score was significantly different from those exposed to control strategy. This implies that group based and individaualised strategies were the main sources of significant differences in treatment.

H_o2a: There is no significant main effect of computer anxiety on SS II geography students' achievement in map reading.

Table 4.1 showed that there was no significant main effect of computer anxiety on SS II geography students' achievement in map reading ($F_{(2, 487)} = 2.840$, $p>0.05$, partial $\eta^2 = 0.012$). Thus, hypothesis 2a was not rejected. This indicated that computer anxiety had no effect on SS II geography students' achievement in map reading**.**

H_o2b: There is no significant main effect of computer anxiety on SS II geography students' attitude towards map reading.

Table 4.4 showed that there was no significant main effect of computer anxiety on SS II geography students' attitude towards map reading ($F_{(2, 487)} = 1.199$, $p>0.05$, partial $\eta^2 = 0.005$). Hence, hypothesis 2b was not rejected.

H_o3a: There is no significant main effect of perceived relevance on SS II geography students' achievement in map reading.

Table 4.1 showed that there was no significant main effect of perceived relevance on SS II geography students' achievement in map reading ($F_{(2, 487)} = 0.657$, $p>0.05$, partial $\eta^2 = 0.003$). Hence, hypothesis 3a was not rejected. This implies that perceived relevance had no effect on SS II geography students' achievement in map reading.

H_o3b: There is no significant main effect of perceived relevance on SS II geography students' attitude towards map reading.

Table 4.4 showed that there was no significant main effect of perceived relevance on SS II geography students' attitude to map reading ($F_{(2, 487)} = 0.234$, $p>.05$, partial $\eta^2 = 0.001$). Hence, hypothesis 3b was not rejected.

H_o4a: There is no significant interaction effect of treatment and computer anxiety on SS II geography students' achievement in map reading.

Table 4.1 showed that there was no significant two-way interaction effect of treatment and computer anxiety on SS II geography students' achievement in map reading

($F_{(4,487)}$ = 0.144, p>0.05, partial η^2 = 0.001). Thus, the null hypothesis 4a was not rejected. This implies that treatment and computer anxiety had no effects on SS II geography students' achievement in map reading.

H_o4b: There is no significant interaction effect of treatment and computer anxiety on SS II geography students' attitude towards map reading.

Table 4.4 showed that there was no significant two-way interaction effect of treatment and computer anxiety on SS II geography students' attitude towards map reading ($F_{(4, 487)}$ = 1.435, p>0.05, partial η^2 = 0.024). Hence, hypothesis 4b was not rejected. This implies that treatment and computer anxiety had no effects on SS II geography students' attitude towards map reading.

H_o5a: There is no significant interaction effect of treatment and perceived relevance on SS II geography students' achievement in map reading.

Table 4.1 showed that there was no significant two-way interaction effect of treatment and perceived relevance on SS II geography students' achievement in map reading ($F_{(4, 487)}$ = 0.316, p>0.05, partial η^2 = 0.001). Hence, the null hypothesis 5a was rejected. This implies that treatment perceived relevance had no effects on SS II geography students' achievement in map reading**.**

H_o5b: There is no significant interaction effect of treatment and perceived relevance on SS II geography students' attitude towards map reading

Table 4.4 revealed that there was no significant two-way interaction effect of treatment and perceived relevance on SS II geography students' attitude towards map reading ($F_{(4, 487)}$ = 0.648, p>0.05, partial η^2 = 0.003). Thus, the null hypothesis 5b was not rejected. This implies that treatment and perceived relevance had no effects on SS II geography students' attitude towards map reading**.**

H_o6a: There is no significant interaction effect of computer anxiety and perceived relevance on SS II geography students' achievement in map reading.

Table 4.1 showed that there was no significant two-way interaction effect of computer anxiety and perceived relevance on SS II geography students' achievement in map reading ($F_{(4, 487)}$ = 1.863, p>0.05, partial η^2 = 0.015). Hence, the null hypothesis 6a was not rejected.

H_o6b: There is no significant interaction effect of computer anxiety and perceived relevance on SS II geography students' attitude towards map reading

Table 4.4 revealed that there was a significant two-way interaction effect of computer anxiety and perceived relevance on SS II geography students' attitude towards map

reading ($F_{(4, 487)} = 2.668$, $p<0.05$, partial $\eta^2 = 0.021$). The effect size is 2.1%. Thus, the null hypothesis 6b was rejected. This implies that computer anxiety and perceived relevance had effects on SS II geography students' attitude to map reading. In order to disentangle the interaction effect, Figure 1 presents the interaction in line graph.

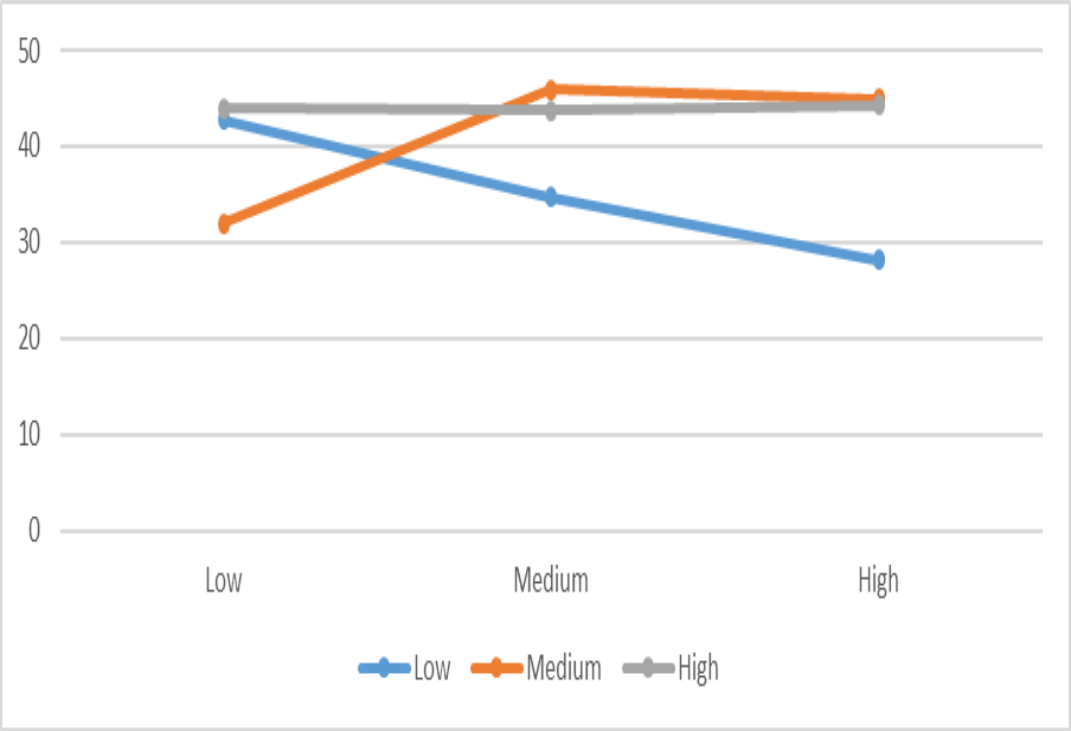


Figure 4.1. Computer anxiety and perceived relevance on SS II geography students' attitude to map reading.

H_o7a: There is no significant interaction effect of treatment, computer anxiety and perceived relevance on SS II geography students' achievement in map reading

Table 4.1 revealed that there was no significant three-way interaction effect of treatment, computer anxiety and perceived relevance on SS II geography students' achievement in map reading ($F_{(6, 487)} = 0.746$, $p>0.05$, partial $\eta^2 = 0.003$). Thus, the null hypothesis 7a was not rejected. This implies that treatment, computer anxiety and perceived relevance had no effects on SS II geography students' achievement in map reading**.**

H_o7b: There is no significant interaction effect of treatment, computer anxiety and perceived relevance on SS II geography students' attitude towards map reading.

Table 4.4 revealed that there was no significant three way interaction effect of treatment, computer anxiety and perceived relevance on SS II geography students' attitude towards map reading ($F_{(6, 487)} = 0.468$, $p>0.05$, partial $\eta^2 = 0.002$). Thus, the null hypothesis 7b was not rejected. This depicted that treatment, computer anxiety and perceived relevance had no effects on SS II geography students' attitude towards map reading.

4.3 Discussion of Findings

4.3.1 Treatment and SS II Geography Students' Achievement in Map Reading

The findings from the study indicated that there was a significant main effect of treatment on SS II geography students' achievement in map reading. This implies that digital storytelling strategy has significant influence on geography students' achievement in map reading. In other words, students who were exposed to this strategy performed better in map reading than students in the control group. The inherent potentials of digital storytelling to actively engage students and stimulate their interest could have been responsible for this improvement in students' achievement after the experiment. Some of the critical factors that had been documented in literature to be responsible for students' poor achievement in map reading are the problems of engagement and inability to connect map reading activities with geographical features in students' immediate environment. Many students consider map reading as a difficult and abstract concept that is not connected to real life situation, due to the strategy employed by geography teachers at the secondary school level of education.

Many scholars like Falode et al (2016), Egunjobi, (2014) and others, developed instructional packages to demystify teaching and learning of map reading in secondary schools. However, many of these packages were not developed with local media content, to make learning more realistic to the students in the classroom. Therefore, the digital storytelling package used for this study was developed with media content within learners' immediate environment. The package was developed to cater for the needs and aspirations of Nigerian secondary school students. In other words, the videos and pictures used to develop the package were sourced from within learners' geographical location and this made map reading concepts more realistic to the students. Digital storytelling combines the natural power of storytelling and capabilities of media to stimulate students' interest and actively engage them in classroom activities.

These findings corroborate Yang and Wu (2012) who examined the influence of digital storytelling strategy on English students' critical thinking, motivation and academic achievement in secondary school. The results showed that secondary school students in DST mode had higher performance in terms of enhanced critical thinking abilities and improved motivation to learn instructional content, than the participants in lecture-type mode who only listened to instruction through conventional approach.

The qualitative result from the study indicated that teachers and students believed that digital storytelling promoted deep learning, simplification of instructional content, readiness to explore and critical thinking ability during classroom instruction.

The affordances provided by digital storytelling could have been responsible for the improved performance of students in map reading after the experiment. The digital storytelling package was made up of local pictures, graphics and videos that allowed students to properly relate classroom activities with their immediate environment. Apparently, these local media contents reflect local realities and sustain the relationship between classroom activities and geographical landforms in the community. Students in the treatment group were able to watch secondary school students exploring the landforms in the community and that could have had positive impact on their level of understanding as they have been better positioned to relate and internalise the concept being taught in map reading classroom.

It should be noted that images are basically considered as stimulants that facilitate teaching-learning process at all levels of education. These images and videos could have stimulated learners to be more engaged with the curriculum content and at the end improved their performance in map reading. Also, the digital storytelling package used for the study included class activities that were inserted within the story to engage students in the instructional content. This could have motivated students to give maximum attention to the details of the content while watching the package. It is worthy to note that students could sometimes be carried away with the euphoria of using technology to learn and thus pay less attention to the content of the story. Therefore, incorporating class activities within the story could have encouraged students to give required attention to the details of the instructional content and as such, geography teachers were able to progressively monitor the rate at which students learn in the classroom.

In the same vein, this study was anchoured on multiple intelligences learning theory and the theory emphasises nine levels of intelligences that should be developed in students, if a teacher intends to engage them and improve their performance in classroom activities. The use of digital storytelling strategy could have developed some of these intelligences in learners and resulted in improved performance in map reading. For instance, verbal/linguistic intelligence, visual/spatial intelligence, musical intelligence, interpersonal and intrapersonal intelligences could significantly be developed through the use of digital storytelling for instructional delivery. The

improved achievement of geography students in the treatment group could not be unconnected with the capabilities of digital storytelling to develop and reinforce these intelligences in classroom instruction. Especially in the area of visual/spatial intelligence, visual representations like pictures and videos that accompany digital storytelling package promote visual and spatial intelligence of the students in the classroom. Students are able to connect abstract concept like map reading to real life experience with appropriate visual representations in digital storytelling. This could have enhanced their performance in map reading than students in the control group.

Findings also revealed that geography participants in group-based mode scored higher grades than students in the individualised group. The strategic roles of collaboration and teamwork had been emphasised in classroom setting, to promote all-inclusive instructional delivery and improved performance of students at all levels of education. The level of achievement attained by the students in the group-based mode could be due to the power of collaboration and interaction that gave impetus to the sharing of ideas among students in the group. Participants in this group were able to interact and discuss the content of the story and class activities therein, this could have engendered cross-fertilisation of ideas and collective decision making in instructional activities. When students view the content from different perspectives, members of the group would have proper understanding of the instructional content in the package.

This finding gives empirical credence to other findings on the effectiveness of group-based instruction to improve students' achievement in the classroom. Uwameiye (2016) affirms that students in the cooperative learning mode recorded improved level of achievement in home economics than participants in the conventional mode after the experiment. Also, Gull and Shehzad (2015) remark that cooperative learning activities had a positive impact on academic achievement of students education course. These are the pointers to the fact that group-based activities could promote interaction and teamwork, which could improve the performance of students in the classroom. The multiple intelligences theory used for the study also emphasises the need to promote students' interpersonal intelligence, which could enhance their achievement in classroom activities.

4.3.2 Treatment and SS II Geography Students' Attitude towards Map Reading

The findings from the study indicated that there was a significant main effect of treatment on SS II geography students' attitude towards map reading. This implied that digital storytelling strategy had significant influence on geography students' attitude towards map reading. One of the main challenges to the study of geography as identified in the background to this study is the students' lack of interest and poor attitude to the subject as many of them consider geography as one of the most difficult subjects in the school curriculum. The same thing applies to the map reading component of geography. However, the power of storytelling and the capabilities of multi-media in digital storytelling could actively stimulate learners' interest in the instructional content. Students who were exposed to digital storytelling strategy could have had the opportunity of learning map reading topics in more realistic ways than the other students. In other words, digital storytelling has the capabilities to demystify difficult topics in map reading and therefore stimulate learners' interest in the concept.

The local pictures used to develop the package could also encourage students to pay attention to the details of the content. This could be responsible for the positive attitude of students in experimental group towards map reading. This is corroborated by Hung, Hwang and Huang (2012) who revealed that the project-based learning with digital storytelling significantly improved students' learning achievement, problem-solving competence, and attitude towards science related subjects in secondary school. Kotluk and Kocakaya (2016) in their study affirmed that digital stories have positive effect on high school students' motivation, attitude and interest towards physics as a course of study.

It is worthy of note that the multiple intelligences theory emphasises the need to develop students' intrapersonal intelligence in instructional process. The teacher is expected to deploy appropriate learning strategy and tools that would allow students to understand their own emotions, motivations and interest, which could affect attitude towards instructional content. Digital storytelling strategy affords students these opportunities and this could be responsible for the positive attitude of students in experimental group towards map reading.

Also, there was a slight difference in the mean score of group-based mode from that of individualised group and this could be traced to the impact of

collaboration and peer influence on the students' attitude towards map reading. The opinions and ideas of other members of the group could alter students' attitude towards the concept. Shin and Park (2008) carried out a research on using digital storytelling in a virtual environment, and confirmed that digital storytelling improved students' participation in instructional tasks and enhanced comprehension of the subject matter. Three scenarios of digital storytelling were conducted: in the first situation, students only listened to the instructional content, the second scenario involved students who listened to the content and reacted accordingly, and finally in the third scenario, students collaborated in groups in the classroom. The results showed that students were more engaged, active and enthusiastic in the third scenario.

4.3.3 Computer Anxiety and SS II Geography Students' Achievement and Attitude to Map Reading

The findings from the study reported that there were no significant main effects of computer anxiety on SS II geography students' achievement and attitude to map reading. In other words, the level of computer anxiety had no significant influence on students' attitude and achievement in both experimental and control groups after being exposed to map reading instruction. This could be due to the fact that students in this 21st Century are leaving in media saturated environments and are increasingly adopting the use of technology for different purposes.

Technology has permeated all areas of human endeavours and both teachers and students need to adjust their approaches and dispositions to function effectively in this modern society. Therefore, students' attitude and achievement in map reading might not depend on whether they fear interacting with computers or not. Students could have been left with no other choice than to execute instructional tasks in the classroom, regardless of their dispositions to the use of computers, since technologies like mobile phones, I pads and computers have become parts of their daily lives. Sam, Othman and Nordin (2005) assert that 'in this age of all-pervading use of technology and digital tools in most parts of the world, the issue of computer anxiety and computer use should be made redundant in considering students' learning outcomes in the classroom'. Findings from their study show that undergraduate students participated in classroom activities regardless of their computer self-efficacy and computer anxiety levels. Isil (2015) finds out that computer anxiety has no significant influence on learning outcomes of Turkish Physical Education teachers after the experiment. However, this finding negates the result by Ademola (2009) who

affirmed that computer anxiety significantly predicted students' learning outcomes in computer appreciation and utilisation.

4.3.4 Perceived Relevance and SS II Geography Students' Achievement and Attitude to Map Reading

The findings showed that there was no significant main effect of perceived relevance on SS II geography students' achievement and attitude to map reading. Students' perceived relevance had no significant influence on their achievement and attitude towards the concept. The significant impact on students' achievement and attitude might be due to digital storytelling strategy adopted for the study. This indicates that students' attitude and achievement in map reading could not have been influenced only by perception. In other words, perceived relevance could be considered as a means to an end but not an end in itself. Even if students perceive map reading as being relevant to understanding their environments, such perception needs to be complemented with appropriate teaching strategy that would make learning more real to the students and connected to real life situation.

The onus lies on the teacher to adopt appropriate strategy and tools that could help in translating students' perception into practical reality. This is why the situated cognition learning theory adopted for this study emphasises the need for teacher to engage students in learning activities that approximates as close as possible to the context that the newly acquired knowledge will be applied to solve real life problems (Schell and Black, 1997). However, this finding negates the report by Audrey and Choy (2015) who found out that students' perceived relevance of marketing education has significant influence on their performance in the course.

4.3.5 Treatment and Computer Anxiety on SS II Geography Students' Achievement and Attitude to Map Reading

The findings revealed that there was no interaction effect of treatment and computer anxiety on students' achievement and attitude to map reading. This could be due to the fact that technology is greatly influencing all aspects of human endeavours and whether students are exposed to computer-based learning or conventional learning strategy, they need to interact with technological devices to function effectively in this modern society. It also could not be unconnected with students' interaction with computers and other technological devices during the experiment. This experience could have greatly reduced students' level of anxiety towards computers or other technological tools. This indicates that the improvement in students' achievement and

attitude is basically due to the digital storytelling strategy employed in the map reading instructional delivery.

4.3.6 Treatment and Perceived Relevance on SS II Geography Students' Achievement and Attitude to Map Reading

Findings revealed that there was no significant two-way interaction effect of treatment and perceived relevance on SS II geography students' achievement and attitude towards map reading. In other words, it showed that the interaction effect of treatment and perceived relevance did not mutually influence the dependent variables (achievement and attitude) to produce a combine effect. This further emphasises the fact that the treatment had the main significant impact on students' achievement and attitude to map reading. Apparently, the finding confirms the effectiveness of digital storytelling strategy to improve students' achievement and attitude towards map reading in secondary schools.

4.3.7 Computer Anxiety and Perceived Relevance on SS II Geography Students' Achievement and Attitude to Map Reading

The findings show that there was no significant two-way interaction effect of computer anxiety and perceived relevance on SS II geography students' achievement in map reading. However, there was a significant two-way interaction effect of computer anxiety and perceived relevance on SS II geography students' attitude towards map reading. Although the effect size is 2.1%, the result indicated that computer anxiety and perceived relevance could have some level of impact on students' attitude towards classroom instruction. Collin, Diana and Glenn (2011) found out that the sustained application of knowledge gained from physical education classroom significantly correlates with the ability of teachers in making the subject appealing and relevant to solve students' personal and societal problems.

Mottet, Garza, Beebe, Houser, Jurrells and Furler (2008) conducted a study in instructional communication studies, teacher' clear presentation and course content relevance were found to be significant predictors of students' desires to take additional courses in these subject areas. In other words, the clarity of concepts and relevance of instructional contents could have ripple effects on students' learning in other areas of study. Therefore, teachers need to present instructional content in realistic format to make classroom activities connected to students' environment. This can be substantially achieved through the integration of appropriate technological tools in instructional delivery.

4.3.8 Treatment, Computer Anxiety and Perceived Relevance on SS II Geography Students' Achievement and Attitude to Map Reading

The findings indicated that there was no significant three-way interaction effect of treatment, computer anxiety and perceived relevance on SS II geography students' achievement and attitude towards map reading. In other words, it showed that the interaction effect of treatment, computer anxiety and perceived relevance did not mutually influence the dependent variables (achievement and attitude) to produce a combine effect.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary of findings, conclusion and the recommendations.

5.1 Summary of Findings

The findings of this study are summarised thus:

1. There was a significant main effect of treatment on SS II geography students' achievement in map reading. The effect size was 35.0%. Group-Based treatment group had the highest adjusted post-achievement mean score (18.45), followed by Individualised treatment group (17.20). This implied that group-based and individualised strategies were the main sources of significant differences in treatment.
2. There was a significant main effect of treatment on SS II geography students' attitude to map reading. The effect size was 20.6%. The post-attitude towards map reading score of students exposed to group-based mode was not significantly different from their counterparts in individualised group. This indicated that group-based and individualised strategies were the main sources of significant differences in treatment.
3. There were no significant main effects of computer anxiety on SS II geography students' achievement and attitude to map reading.
4. There were no significant main effects of perceived relevance on SS II geography students' achievement and attitude towards map reading.
5. There were no significant two-way interaction effects of treatment and computer anxiety on SS II geography students' achievement and attitude to map reading.
6. There were no significant two-way interaction effects of treatment and perceived relevance on SS II geography students' achievement and attitude to map reading.
7. There were no significant two-way interaction effects of computer anxiety and perceived relevance on SS II geography students' achievement in map reading. There was a significant two-way interaction effect of computer anxiety and perceived relevance on SS II geography students' attitude to map reading.

8. There were no significant three-way interaction effects of treatment, computer anxiety and perceived relevance on SS II geography students' achievement and attitude to map reading.

5.2 Conclusion

This study examined the development of digital storytelling package and determined its impact on students' learning outcomes in map reading in Ibadan metropolis. Digital storytelling was found to be effective in improving geography students' achievement in map reading. Also, the strategy significantly improved students' attitude to map reading because the media component of digital storytelling engaged students in instructional content and made learning connected to real life situation. It could, therefore, be concluded that geography teachers need to adopt pragmatic approach to demystify perceived difficult topics in map reading by leveraging the capabilities of digital storytelling strategy in instructional delivery. This would go a long way in making map reading more interesting and connected to real life situation.

5.3 Recommendations

The following recommendations are made based on the findings from this study:

i. Geography teachers should integrate digital storytelling strategy into map reading classroom, as it has proven to be effective in reducing the level of abstractness associated with the teaching and learning of this concept at the secondary school level.

ii. Geography teachers should be trained on the rudiments of creating digital storytelling for effective classroom instruction.

iii. Teachers should leverage the capabilities of digital storytelling to improve students' achievement and attitude to map reading at the secondary school level.

iv. Group-based digital storytelling could be a viable strategy in improving students' achievement and attitude to the content of instruction, as the finding reveals that it promotes collaboration and teamwork among members of the class.

v. Educational stakeholders should provide adequate facilities for teachers to integrate this strategy into teaching-learning process.

5.4 Educational Implications of Findings

This study has affirmed the challenges that confront the effective teaching-learning process in map reading classroom and proffer solutions to overcome these recurrent problems. The two modes of digital storytelling could be employed by geography teachers to demystify perceived difficult topics in map reading and stimulate learners' interest in the instructional content. The following are the educational implications of the study:

i. Digital storytelling has provided students with the opportunities of connecting classroom instruction with features in the community. This has improved their level of achievement and attitude to map reading.

ii. The two modes of digital storytelling engendered active engagement with the instructional content which has resulted in positive attitude to map reading. The class activities in the stories gave teachers the opportunity to progressively monitor learning in the classroom.

iii. The local pictures and videos used for the package allowed students to connect map reading activities in the classroom to the features and landforms in their immediate environment. This has practically solved the problem of disconnect between classroom instruction and features in students' community.

iv. Also, the group-based mode of digital storytelling engendered collaboration and teamwork among members of the group and this has resulted into improved achievement and positive attitude to map reading.

5.5 Contributions to Knowledge

i. The study has established the fact that digital storytelling strategy was effective in improving students' achievement in map reading.

ii. The study also addressed the challenge of poor students' attitude to the instructional content as students in the experimental group recorded improved attitude to map reading after the instruction.

iii. The study provided a strong justification for digital storytelling strategy as a viable option to enrich the conventional teaching strategy.

iv. The class activities in the digital storytelling package afforded teachers the opportunity to engage students in the instructional content.

v. Lastly, digital storytelling strategy has created a platform for students to connect classroom activities with features in their immediate environments.

5.6 Limitations of the Study

There were constraints in the course of this study. These are:

i. Map reading is a strategic aspect of geography, but there are other critical aspects of the subject like human and regional geography which the study did not cover.
ii. The study was limited to senior secondary school students, excluding students from other levels of education.
iii. The study covered five hundred and six participants from three schools in Ibadan metropolis due to the optional status of geography at the senior secondary school level of education. Geography is now an optional subject even for science students in senior secondary schools. Therefore, selecting schools with the required facilities and geography students posed great constraints to the study.
iv. Only six topics from SS II map reading were covered in the study.

5.7 Suggestions for Further Studies

Based on the limitations to the study, the following suggestions were made for further study:

i. Digital storytelling has been affirmed as an effective strategy to engage students at all levels of education. Therefore, this study could be replicated at primary and tertiary levels of education and in other subjects.
ii. The strategy could be used for other aspects of geography at the senior secondary school level.
iii. Digital storytelling packages could be developed to cover other topics in map reading.
iv. Lastly, there could be further investigation on interaction effects of other moderator variables like age, gender and readiness on the students' achievement and attitude towards map reading.

REFERENCES

Abdel-Hack, E.M. and Helwa H. 2014. Using digital storytelling and weblogs instruction to enhance EFL narrative writing and critical thinking skills among EFL majors at Faculty of Education. *Educ. Res.* 5.1:8-41

Abdullah, A.M. A.G. 2010. The effect of co-operative learning on the academic achievement and retention of the Mathematics concepts at the primary school in Holy Makkah. *Journal of King Saud University* 22.2:13 – 23.

Achilles, C. M., and Hoover, S. P. 1996. Transforming administrative praxis: the potential of Problem-Based Learning (PBL) as a school-improvement vehicle for middle and high schools. *Eric Document Reproduction Service* No. ED397471.

Adebisi, I. A. 1988. Difficult aspects of map reading. A case study of ten secondary schools in Ibadan municipal local government. In Okafor, F. C. (eds). *The New Geography. Nigeria Geography Teachers' Association (South Western Zone)*.

Adedoja, Gloria and Bello, L. K. 2016. Computer self-efficacy and attitude of University of Ibadan pre-service teachers towards the use of digital storytelling as a delivery method of instruction. *Nigerian Journal of Social Work Education* 15: 51-61

Adegoke, K. A. 1984. Achievement level of Nigerian School Certificate geography candidates in understanding mapwork. *Paper presented at Ilesa in Nigeria Geography Teachers' Association Workshop.*

Ademola O. R. 2009. Influence of computer anxiety and knowledge on computer utilization of senior secondary school students. *Electronic Journal of Research in Educational Psychology*. 7.19:1269-1287

Adeyemi, S.B. 2002. Relative effects of cooperative and individualistic learning strategies on students‘ declarative and procedural knowledge in mapwork in Osun State, Nigeria. Unpublished Ph.D. Thesis, University of Ibadan, Ibadan, Nigeria.

Adeyemi, S. B. 2014. Effect of gender on secondary school students' achievement in mapwork. *European Journal of Educational Studies* 6.1: 72-80

Agarwal, R. and Karahanna, E. 2000. Time flies when you’re having fun: cognitive absorption and beliefs about information technology usage. *MIS Quarterly* 24.4: 665-694.

Agbatogun, O.A. 2010. Self-concept, computer anxiety, gender and attitude towards interactive computer technologies: a predictive study among nigerian teachers. *International Journal of Education and Development Using Information and Communication Technology* 6.2: 55-68.

Akorede, V. E. 1981. Students' performance in school certificate geography: the geographers' search light, *Journal of the geographical Society, Osun State College of Education,* Ilesa. 2: 35 - 60.

Alf, L., Keithia W. and Roland, S. 2002. University students' perceptions of the learning environment and academic outcomes: implications for theory and practice. *Studies in Higher Education* 27.1.

Al-Gharibi, Z. M. 2008. Attitudes related to social studies with young adolescents in the Sultanate of Oman. Unpublished master's thesis, University of Glasgow, Scotland, United Kingdom. Retrieved August 11, 2009, from http://theses.gla.ac.uk/568/01/2008Al- Gharibimsc(r).pdf

Amosun, P.A. and Oderinde, F.O. 2004. Performance and attitude of male and female students in physical geography in urban and rural schools of OgunState. Retrieved September 2,2011 from http/ajeduionline.org/AJEDUI/11.rtf.

Amosun, P. A. 2002. Three models of group learning strategies, mathematical abilities and gender as determinants of secondary school students' learning outcomes in map work. Unpublished PhD Thesis, University of Ibadan.

Amosun, P. A. 2016. Why Nigerian geography teachers scarcely and scantly teach map reading and why students are scared of it. *African Educational Research Journal* 4.2:42-48.

Ana G. 2015, Digital storytelling as an innovative element in English for specific purposes *Procedia - Social and Behavioral Sciences* 178 110 – 116

Ande, I. I. 1990. Developing requisites skills for effective learning of mapwork in 6-3-3-4 system of education. *The Nigerian Geography Teachers'Association Journal (Southern Western Zone).*

Anderson, Kay and Smith, S. 2001. Emotional geographies. *Transactions of the Institute of British Geographers* 26:7-10.

Aneta P. and Craig C. 2010. Understanding digital storytelling: individual 'voice' and community-building in youth media programs. *Seminar.net - International journal of media, technology and lifelong learning.* 6 (Issue 2)

Anthony, L. M., Clarke, M. C., and Anderson, S. J. 2000. Technophobia and personality subtypes in a sample of South African university students. *Computer in Human Behavior* 16. 1: 31-44.

Asthan, A. 2012. Multimedia in education: Introduction to the element of educational requirements and classroom architecture. *Journal of Resources Concerns* Retrieved from http://encyclopedia.org/articles/pages/6821/multimedia-in-Education.html

Audrey M. and Choy S. 2015. Students' perceptions of the relevancy of marketing education. *Journal of Social Sciences and Humanities* 10.1: 208 – 222.

Balanskat, A., Blamire, R. and Kafal, S. 2007. A review of studies of ICT impact on schools in Europe. *European Schoolnet*

Barrett H. 2006. Convergence of student-centered learning strategies. *Technology and Teacher Education Annual* 1: 647-654.

BECTA 2004. A review of the research literature on barriers to the uptake of ICT by teachers.Retrieved June 10, 2010, fromhttp://partners.becta.org.uk/page_documents/research/barriers.pdf.

Behmer, S. 2005. *Literature review of digital storytelling: examining the process with middle school students*. Iowa State University.

Benmayor, R. 2008. Digital storytelling as a signature pedagogy for the new humanities. *Arts Humanity High Educ* 7.2:188–204.

Bitner, N. and Bitner, J. 2002. Integrating technology into the classroom: eight keys to success. *Journal of Technology and Teacher Education* 10.1:95-100.

Booth, P., Luckett, P., and Mlavedonic, R. 1999. The quality of learning in accounting education: the impact of approaches to learning on academic performance. *Accounting Education* 8: 277-300.

Bottino, R. M. and Robotti, E. 2007. Transforming classroom teaching and learning through technology: analysis of a case study. *Educational Technology and Society* 10.4:174-186.

Bran R. 2010. Message in a bottle Telling stories in a digital world. *Procedia Social and Behavioral Sciences* 2: 1790–1793.

Brown, D. and Warschauer, M. 2006. From the university to the elementary classroom: students' experience in learning to integrate technology in instruction. *Journal of Technology and Teacher Education* 14.3:599-621.

Brown, J. S., Collins, A. and Duguid, P. 1989. Situated cognition and the culture of learning. *Educational Researcher* 18.1:32-42.

Brown, J., Bryan, J., and Brown, T. 2005. Twenty-first century literacy and technology in K-8 classrooms. *Innovate* 1.3.

Burmark, L. 2004. Visual presentations that prompt, flash and transform. *Media and Methods* 40.6: 4–5.

Butler, J. 2010. In-service teachers and technology integration: digital storytelling reduces teachers' management concerns in the Concerns-Based Adoption Model (CBAM). *Proceedings of Society for Information Technology and Teacher Education International Conference* 1210-1217

Cashin, W. E., and Downey, R. G. 2000. Using global student rating items for summative evaluation: convergence with a second criterion. *Paper Presented at the Annual Meeting of the American Educational Research Association, Montreal, Quebec, Canada.*

Chang, H. H. 2005. The relationship between extrinsic/intrinsic motivation and language learning strategies among college students of English in Taiwan. Ming Chuan University.

Christian P. 2012. Co-operative and individualized strategies as predicators of students' achievement in secondary school chemistry in Rivers State. *Journal of Vocational Education and Technology* 9.2.

Christodoulou, M.D. 2009. Seasonality of violent suicides in the Athens Greater Area. *The American Association for Suicidology* 39.3

Chu, H. C., Hwang, G. J., and Tsai, C. C. 2010. A knowledge engineering approach to developing mind tools for context-aware ubiquitous learning. *Computers and Education* 54.1:289-297.

Chua, S., Chen, D.T., and Wong, F.L. 1999. Computer anxiety and its correlates: a meta-analysis. *Computers in Human Behavior* 15: 609-623.

Chu, S. K. W., Tse, S. K., and Chow, K. 2011. Using collaborative teaching and inquiry project-based learning to help primary school students develop information literacy and information skills. *Library and Information Science Research* 33.2: 132-143.

Chung S 2006. Digital storytelling in integrated arts education. *The International Journal of Arts Education* 4.1:33-63.

Churchland, P. S. 1986. *Neurophilosophy: toward a unified science of the mind/brain.* Cambridge, MA: MIT Press.

Coker, J. 2009. Reinventing life: introductory biology for a rapidly evolving world. *Development Journal of Language Teaching and Research* 4.4:684-692.

Coley, Cradler, and Engel, 2007. Computers and Classrooms: The Status of Technology in U.S. Retrieved from ftp://ftp.ets.org/pub/res/compclss.pdf

Collier, J. and Veres, M. 2006. Digital storytelling in an early childhood literacy methods course: authentic product development's impact on students' valuing of technology. *Proceedings of Society for Information Technology and Teacher Education, New York*. Crawford,C et al. (Eds)

Collins, T. Jr. 1996. The effects of computer-assisted algebra instruction on achievement, mathematics anxiety levels and attitudes toward personal use of students in a historically black University. PhD Thesis, University of South Florida.

Collin W., Diana M. and Glenn W. 2011. The Influence of state motivation, content relevance and affective learning on high school students' intentions to use class content following completion of compulsory physical education. *Journal of Teaching in Physical Education* 30: 231-247

Cortazzi, M., and Jin, L. 2007. Narrative learning, EAL and metacognitive development. *Early Child Development and Care 177*, 645–660.

Crable, E. A., Brodzinski, J. D., Scherer, R. F., and Jones, P. D. 1994. The impact of appraisal, locus of control, and level of exposure on the computer anxiety of novice computer users. *Journal of Educational Computing Research* 10.4 :329-340.

Damasio, A. R. 1994. *Descartes' error: emotion, reason, and the human brain*. New York: Avon.

Dogan, B. and Robin, B. 2009. Educational uses of digital storytelling: creating digital storytelling contests for K-12 students and teachers. *Proceedings of the International Conference of the Society for Information Technology and Teacher Education* 633-638.

Dompreh, C. 1978. *School certificate map reading for West Africa*, Accra. Fep International Private Ltd. 22-30.

Dreon, O. Kerper, R.M. and Landis, J. 2011. Digital storytelling: a tool for teaching and learning in the YouTube generation. *Middle School Journal* 42.5:4-9

Drent, M., and Meelissen, M. 2008. Which factors obstruct or stimulate teacher educators to use ICT innovatively? *Computers and Education* 51.1:187-199.

Drewery, D., Pretti, J., and Pennaforte, A. 2015. Conceptualizing the quality of cooperative education work term experiences: an exploration from the students' perspective. *Paper presented at WACE World Conference on Cooperative & Work-integrated Education: Kyoto, Japan.*

Effendi, Z. and Iksan, Z. 2007. Promoting cooperative learning in Science and Mathematics: a Malaysian perspective. *Eurasian Journal of Science, Mathematics and Technology Education* 3.1:35-39

Egunjobi, A.O. 2002. The relative effectiveness of computer-assisted instructional modes on students' learning outcomes in geography. Unpublished Ph.D. Thesis, University of Ibadan, Ibadan, Nigeria.

Egunjobi, A.O. 2007. *Concise and basic concepts of educational technology*. Ibadan: Ejon Publishers Ltd. 107-124.

Egunjobi, A. O. 2014. Effect of tutorial mode of computer-assisted instruction on students' academic performance in secondary school practical geography in Nigeria *AFRREV STECH An International Journal of Science and Technology* 3.1.

El -Gazzar and Abdel -Latif, E. (2002) Effectiveness of using multimedia computer assisted instruction on acquision of some levels of learning of scientific concepts according to Frayer's Model of Concepts' Evaluation. *Journal of Education, Scientific Refereed Journal, Faculty of Education, Al -Azhar University, Cairo* 155: 37-83.

Ellen M. 2012. Using TPCK with digital storytelling to investigate contemporary issues in educational technology. *Journal of Instructional Pedagogies* 6.2

Falode, O. C. 2014. A Bates' "ACTIONS" evaluation of virtual laboratory package on selected physics concepts for Nigerian secondary schools. An Unpublished PhD thesis. Ilorin: University of Ilorin.

Falode, O. C. Usman, H. Ilobeneke, S. C. Mohammed, H. A. Godwin, A. J and Jimoh, M. A. 2016. Improving secondary school geography students' positive attitude towards map reading through computer simulation instructional package in Bida, Niger state, Nigeria *Bulgarian Journal of Science and Education Policy (BJSEP)*10.1.

Fan, F. A., Monday, V. I. and Tandu, M. A. 2014. Generating socio-economic values and skills in learners through geography, civic and environmental education. *Global Advanced Research Journal of Educational Research and Reviews* 3.5:102-109.

Federal Republic of Nigeria. 2009. National Policy on Education. Lagos: Federal Government Press.

Garba, S.A., Singh, T.K., Yusuf, N.B. and Ziden, A.A. 2013. An overview of technology integration in nigerian colleges of education. *Journal of Education and Learning* 7.1:35-42.

Gersmehl, P. 2014. *Teaching geography*. NYC Guilford Publications.

Gils, F. 2005. Potential applications of digital storytelling in education. *3rd Twente Student Conference on IT, University of Twente, Faculty of Electrical Engineering, Mathematics and Computer Science*, *Enschede*.

Glen, B. and Kadjer, B. 2005. Does Blogging Have a Place in Teacher Education? Incorporating Blogs and Determining Their Effectiveness in PIHnet. In C. Crawford, R. Carlsen, I. Gibson, K. McFerrin, J. Price, R. Weber & D. Willis (Eds.), *Proceedings of SITE 2005--Society for Information Technology & Teacher Education International Conference*. Phoenix, AZ, USA: Association for the Advancement of Computing in Education (AACE).

Green, A. M. 1998. Project-based learning: moving students through the GED with meaningful learning. *ERIC Document Reproduction Service* No.422466.

Groff, J., and Mouza, C. 2008. A framework for addressing challenges to classroom technology use. *Association for the Advancement of Computing in Education Journal* 16.1:21-46.

Gull F., Shehzad S. 2015. Effects of cooperative learning on students' academic achievement. *Journal of Education and Learning* 9.3: 246-255.

Haigh, C. and Hardy, P. 2010. Tell me a story: a conceptual exploration of storytelling in healthcare education. *Nurse Education Today* 6.2.

Hamilton, B. 2010. Making the most of a teaching partner. *The Reading Teacher,* 63.3

Harm, B 2009. Geographic education and public policy. *An address Presented before the NCGE Opening Session, Gardner Auditorium, Massachusettes State House.*

Heinssen, R.K., Glass, C.R., and Knight, L.A. 1987. Assessing computer anxiety: development and validation of the computer anxiety rating scale. *Computers in Human Behavior* 3.49-59.

Heo, M. 2009. Digital storytelling: an empirical study of the impact of digital storytelling on pre-service teachers' self efficacy and dispositions towards educational technology. *Journal of Educational Multimedia and Hypermedia* 18.4:405-428.

Hernandez, R. 2003. Student engagement in assessment for learning. Retrieved from http://icep.ie/wp-content/uploads/2010/01/Hernandez.pdf

Hilton, T., Hughes, T. and McDowell, R. 2007. Does the marketing curriculum reflect the importance of services marketing for practitioners? *The Marketing Review* 7.2:171-184. doi: 10.1362/146934707X198876

Ho, W. C. and Hong G. 2008. The role of multimedia technology in a Hong Kong higher education music program. *Visions of Research in MUSIC Education* 13.2.

Hohman, J., Adams, P., Taggart, G., Heinrichs, J., and Hickman, K. 2006. A nature of science discussion: connecting mathematics and science. *Journal of College Science Teaching* 36.1:18-21.

Holli M. Ley 2008. *Meeting the needs of all students through differentiated instruction: helping every child reach and exceed standards*. Heldref Publications.

Holmes, K. 2011. Planning to teach with digital tools: introducing the interactive whiteboard to pre-service secondary mathematics teachers. *Australasian Journal of Educational Technology* 25.3:351-365.

Houghton, W. 2004. *Engineering subject centre guide: learning and teaching theory for engineering academics.* Loughborough: Higher Education Academy Engineering Subject Centre, Loughborough University

Howard, J. 2002. Technology-enhanced project-based learning in teacher education: addressing the goals of transfer. *Journal of Technology and Teacher Education* 10.3:343-364.

Huang, H. M. and Liaw, S. S. 2005. Using an adaptive survey system to understand learners' perceptions toward web-based learning. *Proceedings at the Taiwan, World Conference on Educational Multimedia, Hypermedia and Telecommunications (ED-MEDIA 2005).*

Huesca, R. 2008. Youth-produced radio and its impacts: from personal empowerment to political action. in Carpenter, N. and Cleen, B. D. (Eds.) *Participation and Media Production: Critical Reflections on Content Creation.* Cambridge Cambridge Scholars Publishing.

Huffman, S. 2009. Integrating pedagogy and technology: the SEAMEO INNOTECH experience. *Presentation to experts' meeting on Teachers/Facilitators Training in Technology Pedagogy Integration, Bangkok, Thailand* 18-20.

Hughes, J. 2005. The role of teacher knowledge and learning experiences in forming technology-integrated pedagogy. *Journal of Technology and Teacher Education* 13.2:277-302.

Hung, C.M., Hwang, G.J. and Huang, I. 2012. A project-based digital storytelling approach for improving students' learning motivation, problem-solving competence and learning achievement. *Educational Technology and Society* 15.4:368–379.

Hwang, G. J., and Chang, H. F. 2011. A formative assessment-based mobile learning approach to improving the learning attitudes and achievements of students. *Computers and Education* 56.1:1023-1031.

Hwang, G. J., Chu, H. C., Lin, Y. S., and Tsai, C. C. 2011. A knowledge acquisition approach to developing mindtools for organizing and sharing differentiating knowledge in a ubiquitous learning environment. *Computers and Education* 57.1.

Idoko, J. E. 2009. Correlation of student O'level Entry Grade in Mathematics and performance in National Diploma in Engineering, Kaduna Polytechnic Nigeria. An Unpublished PhD thesis Federal University of technology Minna.

Ifamuyiwa, A. S. 2004. The predictive validity of junior secondary mathematics on senior secondary mathematics, further mathematics and physics. *Science Teacher Association of Nigeria 45th Annual Conference*

Ifamuyiwa, A. and Akinsola, M.K. 2008. Improving senior secondary school students' attitude towards mathematics through self and cooperative instructional strategies. *International Journal of Mathematical Education* 39.5: 569-585. DOI: 10.1080/00207390801986874

Isil A. 2015. Computer self-efficacy, computer anxiety, performance and personal outcomes of Turkish physical education teachers. *Education Research and Reviews* 10.3.

Ivala, E., Chigona, A., Gachago, D. and Condy, J. 2013. Enhancing student engagement with their studies: a digital storytelling approach. *Creative Education* 4.10:82-89.

Jackling, B. 2005. Perceptions of the learning context and learning approaches: implications for quality learning outcomes in accounting. *Accounting Education* 14:271-291.

Jing X. 2016. Digital storytelling to promote EFL students' motivation and efficiency in content-based classroom. *Education Journal* 5.6:166-173.

Johnson, D. W., Johnson, R. T. and Holubec, E. J. 1996. *Circles of learning: cooperation in the classroom.* Edina, MN: Interaction Book Company.

Jones, A. 2004. A review of the research literature on barriers to the uptake of ICT by teachers. *British Educational Communications and Technology Agency.*

Karakoyun, F., Kocakaya, S. and Kotluk, N. 2016. Pre-service physics teachers views on designing and developing physics digital stories. *Digital Education Review* 30

Keramati M. 2010. Effect of cooperative learning on academic achievement of physics course. *Journal of Computers in Mathematics and Science Teaching* 29.2:155-173.

Kim, H. 2006. How do we change pre-service teachers‟ perceptions of scientists using digital storytelling. In C. Crawford et al. (Eds.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2006* Chesapeake, VA: AACE.

Koh, J. H. and Frick, T. W. 2009. Instructor and student classroom interactions during technology skills instruction for facilitating pre-service teachers' computer self-efficacy. *Journal of Educational Computing Research* 40.2:211-228.

Koh, J. H. L., Herring, S. C. and Hew, K. F. 2010. Project-based learning and student knowledge construction during asynchronous online discussion. *The Internet and Higher Education* 13.4: 284-291.

Kocakaya, S. and Kotluk, N. 2016. Researching and evaluating digital storytelling as a distance education tool in physics instruction: An application with pre-service physics teachers. *Turkish Online Journal of Distance Education* 17.1.

Kotluk, N. and Kocakaya, S. 2015. Digital storytelling for developing 21st century skills: From high school students' point of view. *Journal of Research in Education and Teaching* 2.36

Krajcik, J. S., Czerniak, C. M., and Berger, C. F. 2003. *Teaching science in elementary and middle school classrooms: A projectbased approach*. New York: McGraw-Hill.

Lambert, J. 2002. *Digital storytelling: capturing lives, creating community.* New York, NY: Routledge.

Lampert, M. 1986. Knowing, doing, and teaching multiplication. Cognitiuti a ~ l d1 11- struction, 3, 305-342.

Lawani, L.A. 2014. The effect of digital storytelling on kindergarten pupils' achievement in moral instruction in basic schools in Oyo State. *IOSR Journal of Research and Method in Education (IOSR-JRME)* 4.5.

Lawson, K. 2005. Using eclectic digital resources to enhance instructional methods for adult learners. *OCLC Systems and Services* 21.1:49-60.

Levin, B. B. 2003. Case studies of teacher development: an in-depth look at how thinking about pedagogy develops over time.

Levin, D. 2002. The digital disconnect: the widening gap between internet savvy students and their schools. *Pew Internet and American Life Project.* Retrieved on March 28, 2009 from ERIC http://www.pewinternet.org/reports/toc.asp?Report=67.

Litterell, A. B., Zagumny, M. and Zagumny, L. L. 2005. Contextual and psychological predictors of instructional technology use in rural classrooms. *Educational Research Quarterly* 29.2:37-47.

Lowenthal, P. R., and Dunlap, J. C. 2010. From pixel on a screen to real person in your students' lives: establishing social presence using digital storytelling. *The Internet and Higher Education* 13.1:70-72.

Lynch, G. and Fleming, D. 2007 Innovation through design: a constructivist approach to learning. LAB 3000, RMIT University. http://lab.3000.com.au/research/research/index.jsp . Retrieved 5 March 2016.

Malita, L. and Martin, C. 2010. Digital storytelling as web passport to success in the 21st Century. *Procedia Social and Behavioral Sciences* 2:3060–3064.

Mansaray, A. 1992. Issue in the teaching of geography for effective learning in the 6-3-3-4 educational system. In Onasanya, K. & Ogunnowo, C. O. (eds.). Teaching geography for optima learning outcomes in the senior secondary schools. *Nigeria Geography Teachers' Association (South Western Zone),* 43 - 63.

Mansaray, A. and Ajiboye, J. O. 1994. Topic difficulty in senior secondary school geography. *Abraka Journal of Curriculum Studies* 11.1: 80 - 92.

Meadows, D. 2003. Digital storytelling: research-based practice in new media. *Vis Commun* 2.2:189–193.

McLellan, H. 1993. Situated learning in focus: introduction to special issue. *Educational Technology* 33.3:5-9.

McPherson, B. 1998. Student Perceptions about Business Communication in Their Careers. *Business Communication Quarterly* 61.2:68-79.

Michael O. 2010. Emerging perspectives on learning, teaching, and technology. an online textbook on new strategies in education.

Milan K, Tomáš J and Katerina M. 2012. Czech student attitudes towards geography. *Journal of Geography* 11.2:67-75

Miller E.A. 2009. Digital storytelling. Unpublished master thesis, University of Northern Iowa.

Morehead, P., Li, L. and LaBeau, B. 2007. Digital storytelling: empowering prospective teachers‟ voices as future educators. In R. Carlsen et al. (Eds.), *Proceedings of Society for Information Technology and Teacher Education International Conference* Chesapeake, VA: AACE.

Mottet, T.P., Garza, R., Beebe, S.A., Houser, M.L., Jurrells, S., and Furler, L. 2008. Instructional communication predictors of ninth-grade students' affective learning in math and science. *Communication Education*. 57: 333–355.

Mueller, J., Wood, E., Willoughby, T., Ross, C. and Specht, J. 2008. Identifying discriminating variables between teachers who fully integrate computers and teachers with limited integration. *Computers and Education* 51.4:1523-1537.

Muhammed N. 2014. Some issues of gender and the teaching of geography in Kano state secondary schools. *American Journal of Humanities and Social Sciences* 2.2:105-110

Mukesh V. and Sarita D. 2015. Perception of students about geography in FNU: a case study *First International Conference on Theory and Practice (ICTP-2015)* ISBN: 978 0 994365651 www.apiar.org.au

Mwenesongole, E. 2016. The factors influencing learner achievement in geography mapwork at grade 12 level. *International Journal of Learning* 16.8:529-544

Najat S., Eva D. and Sharda N. 2014. The effectiveness of digital storytelling in the classrooms: a comprehensive study. *Springer Open Journal*

Namlu, A. and Ceyhan, E. 2002. Computer anxiety: A study on university students. Eskisehir:Anadolu University Publishing.

Necessary, J. R. and Parish, T. S. 1996. The relationships between computer usage and computer-related attitudes and behaviours. *Education*. 116. 3 : 384-388.

Neo, M., and Neo, T. K. 2010. Students' perceptions in developing a multimedia project within a constructivist learning environment: a Malaysian experience. *The Turkish Online Journal of Educational Technology* 9.1: 176–184.

NERDC 2007. Nigerian Educational Research Development Council; Federal Ministry of Education: Senior Secondary Education Curriculum- Geography for SS 1-3.

Noeth, M.B. and Volkov, L.O. 2004. Trends in internet information behaviour. *Journal of the American Society for Information Science and Technology* 59.11:1743-1760.

Normann, A. 2011. Digital storytelling in second language learning. Faculty of Social Sciences and Technology Management Norwegian University of Science and Technology 125

Obondo, Nabwire, V. K. and Jaction, K. T. 2013. Enhancing learning of geography: a focus on video use. *International Journal of Education and Social Science* 2:87-96

Ofomata, G.E. 2006. *Geographic Thought* Nigeria: Jamoe Enterprises

Ohler, J. 2008. *Digital storytelling in the classroom: new media pathways to literacy, learning, and creativity*. Thousand Oaks, CA: Corwin Press

Okunrotifa, P. O. 1973. Programmed learning in the teaching of geography. *West African Journal of Education* 14.30:283-293.

Okunrotifa, P.O. 1973. *The Objectives of geography education* in Majasan J.A. and Adejuyigbe O. (Eds.) Curriculum Innovation in High School Geography. Ibadan, Nigeria: University of Ibadan 30-35.

Okwilagwe, E. A. 2002. Patterns of undergraduate attitude to academic work. *Ibadan Journal of Educational Studies* 2.2: 551-562.

Okwilagwe, E. A. 2012. Influence of teacher factors on attitudes of geography teachers to map work in Nigerian secondary schools. *Ife Psychologia* 4.2

Ololube, N. P. 2005. Bench marking the motivational competencies of academically qualified teachers and professionally qualified teachers in Nigerian secondary schools. *African Symposium* 5.4:17-31.

Oludipe, D. I. 2012. Gender difference in Nigerian junior secondary students academic performance in basic science. *Journal of Educational And Social Research* 2.1: 93-99

Orr, Larry L., Judith D. Feins, Robin Jacob, Erik Beecroft, Lisa Sanbonmatsu, Lawrence F. Katz, Jeffrey B. Liebman, and Jeffrey R. Kling. 2001. Moving to opportunity interim impacts evaluation. *Department of Housing and Urban Development, Office of Policy Development and Research.*

Osborne, J., Simon, S., and Collins, S. 2003. Attitudes towards science: a review of the literature and its implications. *International Journal of Science Education* 25.9:1049-1079.

Özgen, N. 2011. Geography perceptions of prospective geography teachers: example of Turkey. *E-Journal of New World Sciences Academy* 6.4:2569–2587.

Pandian, S.S. 2004. Co-operative learning in biology: the effect of computers. *Department of Education, Arunachi University, India.*

Phelps, R., and Ellis, A. 2002a. Helping students to help themselves: case studies from a metacognitive approach to computer learning and teaching. *Paper presented at the International Conference on Computers in Education (ICCE 2002), Auckland, New Zealand.*

Pierson, M. E. 2001. Technology integration practice as a function of pedagogical expertise. *Journal of Research on Computing in Education* 33:413–430.

Pintrich, P. and Svinick T. 2004. A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review*16:385-407

Pintrich, P. and Zusho, A. 2007. Student motivation and self-regulated learning in the college classroom. *The Scholarship of Teaching and Learning in Higher Education: An Evidence-Based Perspective* 3:731-810. doi:10.1007/1-4020-5742-3_16

Pitler, H. 2006. Viewing technology through three lenses. *Principal-Arlington* 85.5:38–42.

Psomos, P. and Kordaki, M. 2012. Pedagogical analysis of educational digital storytelling environments of the last five years. Procedia. *Social and Behavioral Sciences* 46:1213 – 1218.

Prosser, M. and Trigwell, K. 1999. Understanding learning and teaching by deep and surface learning. *Society for Research into Higher Education and Open University Press, Buckingham, UK.*

Raafat G.S. and Dennis K. 2007. Mediating the impact of technology usage on perceived ease of use by anxiety. *Computers and Education* 49.4:1189-1204.

Raafat G. S. and Dennis K. 2009. Computer anxiety in e-learning: the effect of computer self-efficacy *Journal of Information Technology Education* 8.

Ransdell, M. and Moberly, D. A. 2003. A journey into cooperative learning with teacher education students. *Essays in Education* 6.Summer), retrieved September 5, 2003 from http://www.usca.edu/essays/

Robin, B. R. 2008. Digital storytelling: a powerful technology tool for the 21st century classroom. *Theory into Practice* 47:220-228.

Robin, B. (2011). The educational uses of digital storytelling website http://digitalstorytelling.coe.uh.edu

Robin, B. and Pierson, M. 2005. A multilevel approach to using digital storytelling in the classroom. In C. Crawford, R. Carlsen, I. Gibson, K. McFerrin, J. Price, R. Weber and D. Willis (Eds.), *Proceedings of SITE 2005--Society for Information Technology & Teacher Education International Conference* (pp. 708-716). Phoenix, AZ, USA: Association for the Advancement of Computing in Education (AACE).

Rose, G. 2007. *Visual Methodologies. an introduction to the interpretation of visual materials*. 2nd edition. London: SAGE.

Russell, G and Bradley, G. 1997. Teachers' computer anxiety: implications for professional development. *Education and Information Technologies* 2: 17-30.

Russell, M., Bebell, D., O'Dwyer, L. and O'Connor, K. 2003. Examining teacher technology use: Implications for preservice and in-service teacher preparation. *Journal of Teacher Education* 54.4:297-310.

Saadé, R. and Bahli, B. 2005. The impact of cognitive absorption on perceived usefulness and perceived ease of use in on-line learning: An extension of the technology acceptance model. *Information and Management* 42.2: 317-327.

Saadé, R. and Otrakji, C. 2007. First impressions last a lifetime: effect of disorientation and cognitive load. *Computers in Human Behavior* 23.1:525-535.

Sadik, A. 2006. From national challenges to a global community: establishing and implementing a low cost learning object repository for Egyptian teachers. *Paper 230 presented at the 2nd International Open and Distance Learning Symposium, 13–15 September, Anadolu University, Turkey.*

Sadik, A. 2008. Digital storytelling: a meaningful technology-integrated approach for engaged student learning. *Educational Technology Research and Development* 56:487-506.

Salomon, G. 1996. Studying the computer vs. the whole learning environment: relating analytic and systemic paradigms. In S. Strauss (Ed.). *Development and learning environments*. New York: Ablex.

Sarah, B 2001. Teaching and learning with maps in social studies curriculum. Retrieved from: htt://www.goliathbusinessnews. On 30th August, 2010.

Sam, H. K., Othman, A. E. A., & Nordin, Z. S. 2005. Computer self-efficacy, computer anxiety and attitudes toward the internet: a study among undergraduates in Unimas. *Educational Technology and Society* 8.4:205-219.

Schell, J. W. and Black, R.S. 1997. Situated Learning: An inductive case study of a collaborative learning experience. *Journal of Industrial Teacher Education* 24.4

Sébastien C. 2014. How can we map stories? a cybercartographic application for narrative cartography. *A report presented at the Center for Oral History and Digital Storytelling, Concordia University*

Sharda, N. 2007. Applying movement oriented design to create educational stories. *International Journal of Learning* 13.12:177–184

Sharda, N. 2005. Movement oriented design: a new paradigm for multimedia design. *International Journal of Lateral Computing* 1.1.

Shaw, F. S. and Giacquinta, J. B. 2000. A survey of graduate students as end users of computer technology: New roles for the faculty. *Information Technology, Learning, and Performance Journal* 18.1: 21-39.

Shin, B. J., and Park, H. S. 2008. The effect of digital storytelling type on the learner's fun and comprehension in virtual reality. *Journal of the Korean Association of Information Education* 12.4:417-425.

Sims, D. 2004. *Management learning as a critical process: the practice of storying*. In P. Jeffcutt (Ed.), The foundations of management knowledge (1st ed). UK: Routledge.

Slavin, R. L. 2007. Senior secondary students' performance in Mathematics. *The Journal of Mathematical Association of Nigeria.* 37.1:134-141

Smeda N, Dakich E, Sharda N 2010. Developing a framework for advancing e-learning through digital storytelling. *Proceedings at the IADIS International Conference e-learning 2010, Ed. Miguel Baptista Nunes and Maggie McPherson*. IADIS International Conference, e-Learning 2010 Freiburg, Germany, 26 - 29 July 2010, 169-176.

Sofowora, O. A. and Agbedokun, A. 2010. An empirical survey of technology application in teaching geography in Nigerian secondary schools. *Ethiopian Journal of Environmental Studies and Management* 3.1:46-54.

Spaulding, M. 2007. Comparison of preservice and in-service teachers' attitudes and perceived abilities toward integrating technology into the classroom. The University of Memphis (AAT 3293776).

Spurgeon, C., Burgess, J., Klaebe, H., McWilliam, K., Tacchi, J. and Tsai, M. 2009. Co-creative media: theorising digital storytelling as a platform for researching and developing participatory culture. *ANZCA.* Brisbane.

Stacey, G., and Hardy, P. 2011. Challenging the shock of reality through digital storytelling. *Nurse Education in Practice* 11.2:159-164.

Standley, M. 2003. Digital storytelling: using new technology and the power of stories to help our students learn and teach. Retrieved, 2011, from. http://www.mstandley.com/digital_storytelling.pd

Susanna C. and Andrew S. 2011. Faculty perceptions of relevance in teaching and learning *International Journal of Teaching and Learning in Higher Education* 23.2.

Svinicki, M. D. 2004. *Learning and motivation in the postsecondary classroom.* Bolton, MA: Anker Pub. Co.

Svinicki, M. D. 2010. *Student learning: from teacher-directed to self-regulation*. New York: Wiley 73-83

Tella, A. and Bashorun, M. T. 2012. Attitude of undergraduate students towards computer-based test (CBT): a case study of the University of Ilorin, Nigeria. *Int. J. Inf. and Comm. Technol. Educ*. 8.2:33-45.

Teo, T. 2008. Pre-service teachers' attitudes towards computer use: a Singapore survey. *Australasian Journal of Educational Technology* 24.4:413-424.

Teo, T. 2010. A path analysis of pre-service teachers' attitudes to computer use: applying and extending the technology acceptance model in an educational context. *Interactive Learning Environments* 18.1:65-79.

Tomal, N. 2004. Teaching methods used by our high school geography teacher. *Ministry of National Education, National Education Magazine.* 162: 225–244.

Tsai, M. and Tsai, C. 2003. Students computer achievement, attitude and anxiety, the role of learning strategies. *Journal of Educational Computing research* 28.1: 47-61.

Tshibalo, A. E. 2003. Cooperative learning as strategy to improve the teaching of map work to Grade 11 and 12 geography learners in region 3 (Limpolo Province). A case study conducted at Romaano Mbulaheni Inservice Training Centre. *Proceeding of the 21st International Cartographic Conference (ICC). Durban, South Africa;* 10-16 August

Tsou W., Wang W. and Tzeng Y 2006. Applying a multimedia storytelling website in foreign language learning. *Computers and Education* 47.1:17-28.

Tunçok, B. 2010. A case study: Students' attitudes towards computer assisted learning, computer assisted language learning and foreign language learning. Unpublished master's thesis. Middle East Technical University, Ankara.

University of Houston 2009. The Educational uses of digital storytelling. Available at http://digitalstorytelling.coe.uh.edu.

U.S. Department of Education, Office of Special Education Programs. 2005. Twenty-fifth annual report to Congress on the implementation of the Individuals with Disabilities Education Act. Washington, DC: Author.

Unal O. 2012. High school students' attitudes towards geography courses (Karabuk Sample-Turkey) *World Applied Sciences Journal* 17.3:340-346.

UNESCO, 2010. Teacher and Learning for a Sustainable Future, 2010. 27/12/2013, Available from http://www.unesco.org/education/tlsf/mods/theme_d/mod21.html

Uwameiye B. 2016. Cooperative learning strategy and students' academic achievement in home economics. *International Journal of Academic Research in Progressive Education and Development.* 5: 2

Van Dat T. 2014. The effects of cooperative learning on the academic achievement and knowledge retention. *International Journal of Higher Education* 3.2

VanderArk, T. and Schneider, C. 2012. How digital learning contributes to deeper learning. Available from http://net.educause.edu/ir/library/pdf/CSD6152a.pdf

Van Gils F. 2005. Potential applications of digital storytelling in education. *In Paper presented at the 3rd twente student conference on IT. University of Twente, Department of Electrical Engineering, Mathematics and Computer Science* 7.1:35-42.

WAEC, 2010. Chief examiners reports. School Certificate Examination. May/ June (Nigeria)

WAEC, 2011. Chief examiners reports. School Certificate Examination. May/ June (Nigeria)

WAEC, 2012. Chief examiners reports. School Certificate Examination. May/ June (Nigeria)

WAEC, 2013. Chief examiners reports. School Certificate Examination. May/ June (Nigeria)

WAEC, 2014. Chief examiners reports. School Certificate Examination. May/ June (Nigeria)

WAEC, 2015. Chief examiners reports. School Certificate Examination. May/ June (Nigeria)

WAEC, 2016. Chief examiners reports. School Certificate Examination. May/ June (Nigeria)

Walker, S. 2006. Development and validation of the test of geography-related attitudes (ToGRA). *Journal of Geography* 105.4:175-181.

Weeden, P. 2007. Students' perceptions of geography: decision-making at age 14. *Geography* 92.1:62-73

Wigglesworth, J. 2003. What is the best routh finding strategies of middle school students using GIS. *Journal of Geography* 102.4:282-291.

Wigfield, A. 2004. The development of competence beliefs, expectancies for success, and achievement values from childhood through adolescence. *In A. Wigfield & J. S. Eccles (Eds.), Development of achievement motivation (pp. 91–120)*. San Diego,CA: Academic.

Yaghi, M. and Ghaith, G. M. 2002. Correlates of computing confidence among teachers in international setting. *Computers in the Schools* 19.2: 81-94.

Yang, Y. T. and Wu, W. C. 2012. Digital storytelling for enhancing student academic achievement, critical thinking, and learning motivation: A year-long experimental study. *Computers and Education* 59.2:339-352

Yelland, N. Cope, B. and Kalantzis, M. 2008. Learning by design: creating pedagogical frameworks for knowledge building in the twenty-first Century. *Asia Pacific Journal of Teacher Education* 36.3:197-213.

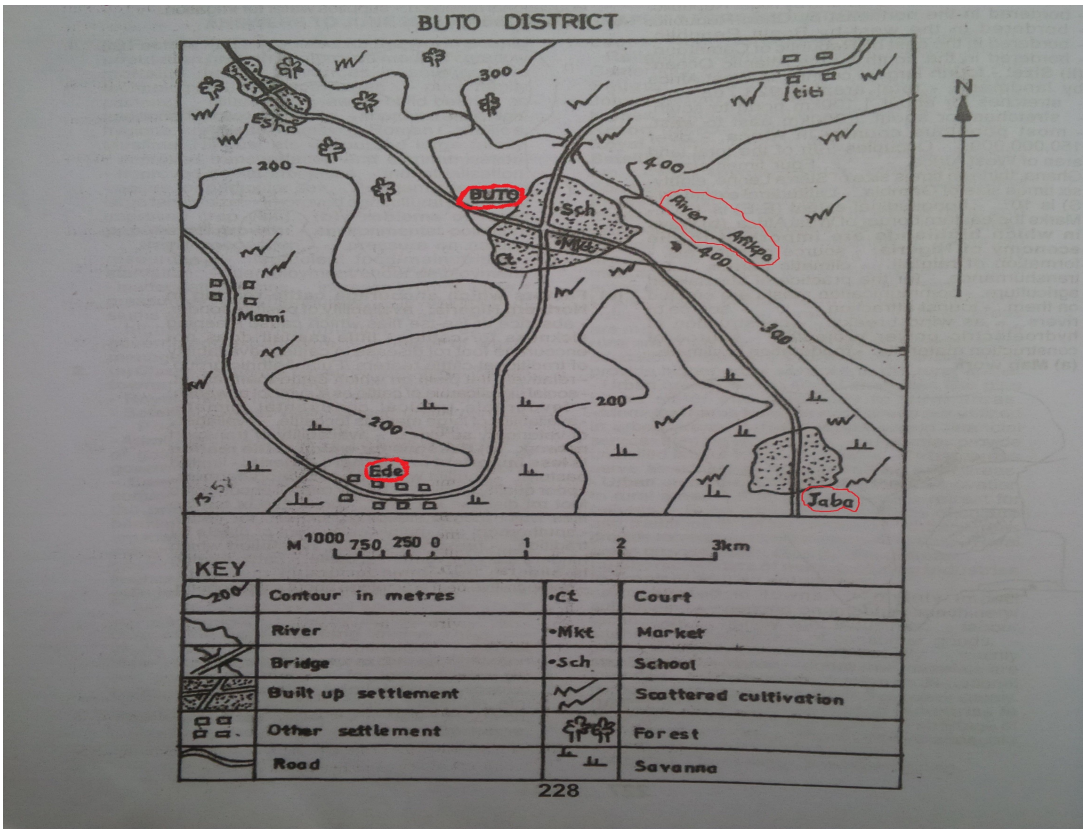
APPENDIX I

MAP READING ACHIEVEMENT TEST

Instruction: Each question is followed by four options lettered A to D. Find out the correct option for each question and tick (√) as appropriate.

1. A valley that contains water is referred to as a ……. (A) water valley (B) spur (C) topographical valley (D) wet valley
2. The relief of an area refers to ……. (A) the position and character of highlands and lowlands on the earth's surface. (B) the structures of the mountains on the earth. (C) the internal structure of the earth. (D) contour interval on the map.
3. The lines on the topographical map that are drawn to join places of equal height is called ……. (A) slope (B) lines of longitude (C) lines of latitude (D) contour lines.

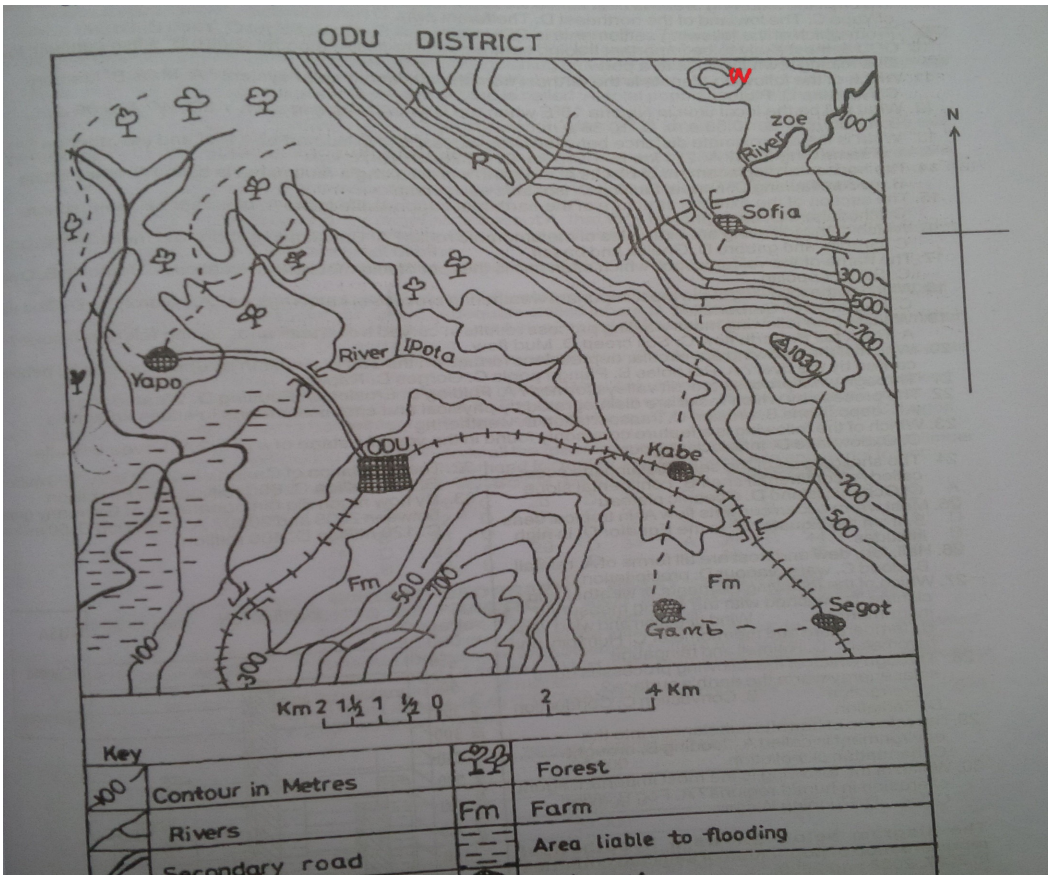
Use this map to answer questions 4 – 6



4. What is the contour interval on the map? (A) 150m (B) 100m (C) 50m (D) 200m
5. The highest point on the map is ……. (A) 150m (B) 300m (C) 250m (D) 400m

6. Identify the direction of flow of River Afikpo. (A) Northeast (B) Southwest (C) Northwest (D) Southeast
7. …… is a feature that separates one valley from another. (A) Ridge (B) Spur (C) Pass (D) Plateau
8. The flow of river on a topographical map could be identified with the use of ……. (A) watershed (B) escarpment (C) plateau (D) contour lines
9. What does increase in the number of contour lines on topographical map indicate? (A) Increase in the relief from the sea level. (B) Decrease in the relief. (C) Plateau (D) Earth Structure
10. A conventional symbol that determines the intervisibility of one area from another area on a topographical map is known as ……. (A) contour line (B) spot height (C) slope (D) watershed
11. In representing the direction of flow of river on topographical map, an arrow could be used to indicate the flow of river from …….. to …… (A) high contour line to low contour line. (B) east to the west (C) low contour line to high contour line (D) swampy area to dry land

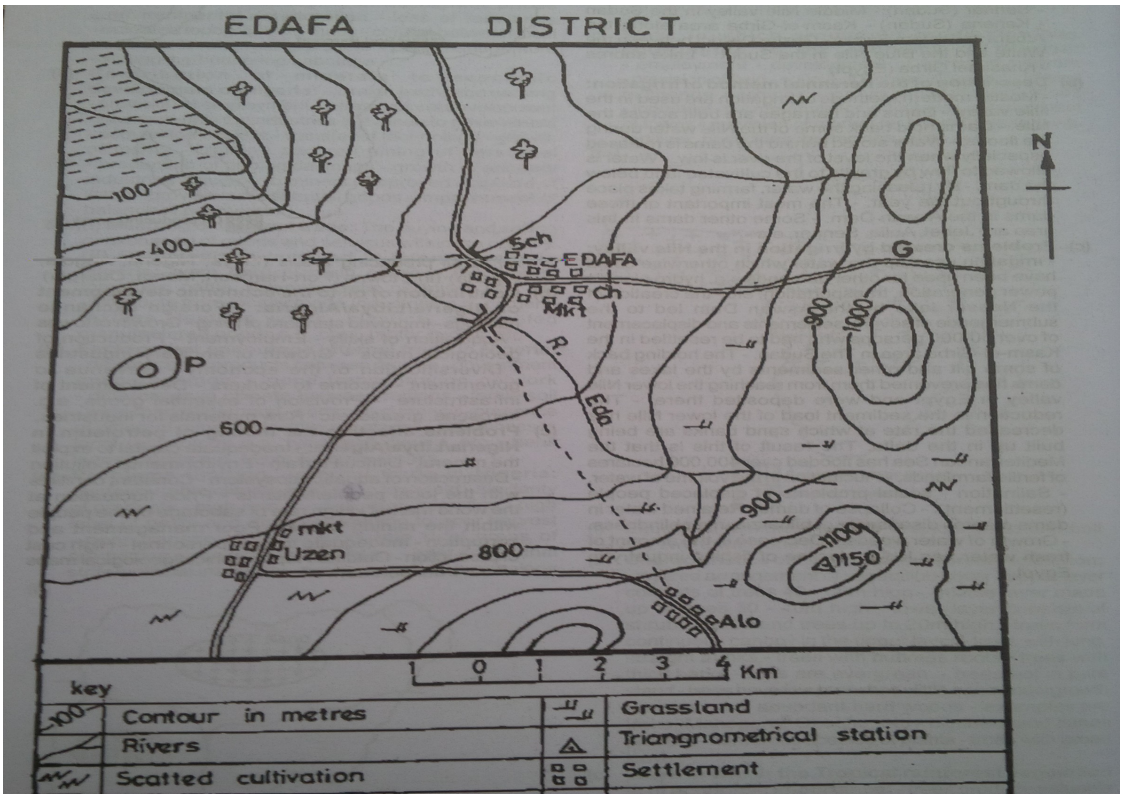
Use this map to answer questions 12 – 14.



12. Which area is visible from ODU? .....…...(A) Yapo (B) Gamb (C) Segot (D) Sofia
13. What is the name of the relief feature represented by W? (A) Ridge (B) Conical Hill (C) Lake (D) River
14. The elongated feature on the northeast part of the map is known as …… (A) plateau (B) Conical Hill (C) ridge (D) spot height
15. From which of the following settlements is Segot visible? (A) Gamb (B) ODU (C) Yapo (D) Ipota
16. In representing ridges on topographical map, the contour lines on both sides run …….. to each other. (A) parallel (B) opposite (C) closer (D) vertical.
17. If point A is 300m, point B 500m and point C is 200m, this means that …… (A) contour point B is a lowland area. (B) point A has high relief than point B. (C) point A can be seen from point C. (D) point A can not be seen from point C.
18. In representing valley on the map, the contour lines …… towards the apex of the mountain (A) increase (B) decrease (C) run parallel (D) remain constant

19. A point at the peak of a conical hill is …… (A) visible to another point at the base of the hill. (B) hotter than another point at the base of the hill. (C) not visible to another point another point on lowland. (D) a plateau.
20. Which of following statements is correct? (A) A valley is the opposite feature of a spur (B) A ridge has conical hills and spurs only (C) A conical hill is the opposite of a spur (D) All of the above.
21. The process of determining whether a point in the map can be seen from another point within the limits of physical sight is known as …… (A) intervisibility (B) contour interval (C) map reading (D) drainage system

Use the map below to answer questions 22 – 24.



22. River Eda flows from ……... to ……. (A) southeast to northwest (B) southwest to northwest (C) northwest to southwest (D) northwest to southeast
23. The highest point on the map is ……. (A) 750m (B) 900m (C) 1100m (D) 1150m
24. Which part of the map has the lowest elevation? (A) Northwest (B) Northeast (C) Southwest (D) Southeast

25. In representing spur on topographical map, the contour lines …… towards the apex of the mountain (A) increase (B) decrease (C) run parallel (D) remain constant

APPENDIX II

QUESTIONNAIRE ON STUDENTS' ATTITUDE TOWARDS MAP READING

INSTRUCTION: This questionnaire is designed to examine the attitude of senior secondary school geography students towards map reading. The data generated would be used for research purpose only and all information provided would be treated with complete confidentiality. Please tick √ the appropriate box that corresponds to your opinion.

SECTION A

Gender: Male ☐ Female ☐

Class: Science ☐ Social Science ☐ Commercial ☐

Age: Early Digital Natives (1980 – 1990) ☐ Late Digital Natives (1990 and above) ☐

SECTION B

SA – Strongly Agree A – Agree D – Disagree SD – Strongly Disagree

S/N	Attitude towards Map Reading	SA	A	D	SD
1.	Map Reading is an interesting aspect of geography to learn.				
2.	If teachers could make learning interesting in the class, map reading would be very easy for students to learn.				
3.	Map reading is too difficult to understand.				
4.	I hate map reading.				
5.	Map reading looks too abstract to me.				
6.	Teachers need to use relevant examples for students to understand concepts in map reading.				
7.	I believe geography teachers should expose their students to map reading from JSS 1 class.				
8.	I believe the knowledge of map reading would allow students understand their environment.				
9.	Map reading is tedious and time consuming				
10.	I would prefer it, if map reading is not part of the school curriculum.				
11.	Map reading promotes critical thinking in students.				
12.	Map reading is not interesting to learn at all.				

13.	The method used by my teacher in teaching map reading makes it difficult for me to understand.				
14.	Map reading is the most interesting aspect of geography to learn.				
15.	Map reading is very easy to understand.				

APPENDIX III

COMPUTER ANXIETY QUESTIONNAIRE

INSTRUCTION: This questionnaire is designed to examine the computer anxiety of senior secondary school students as a factor that could influence the use technology in the classroom. The data generated would be used for research purpose only and all information provided would be treated with complete confidentiality. Please tick √ the appropriate box that corresponds to your opinion.

SECTION A

Gender: Male ☐ Female ☐

Class: Science ☐ Social Science ☐ Commercial ☐

Age: Early Digital Natives (1980 – 1990) ☐ Late Digital Natives (1990 and above) ☐

SECTION B

SA – Strongly Agree A – Agree D – Disagree SD – Strongly Disagree

S/N	ITEMS	SA	A	D	SD
1.	I feel apprehensive about using computers for classroom activities.				
2.	It scares me whenever I think that I could cause the computer to destroy a large amount of information by hitting the wrong key.				
3.	I hesitate to use a computer for fear of making mistakes I cannot correct.				
4.	Computers are somewhat intimidating to me.				
5.	I look forward to using a computer in my future career.				
6.	I feel insecure about my ability to operate computer without help from my friends.				
7.	The challenge of learning about computers is exciting.				
8.	You have to be patient to effectively use computer.				
9.	Learning to operate computers to perform classroom activities is like learning any new skill – the more you practice, the better you become.				
10.	I am worried that if I begin to use computer to learn, I will become dependent upon it and lose some of my				

	reasoning skills.				
11.	I have difficulty in understanding some technical aspects of computers.				
12.	Only brilliant students can understand all the special keys contained on most computer keyboards.				
13.	If given the opportunity, I would like to learn how to use computer to reduce my level of fear in using it.				
14.	I feel computers are not necessary in both educational and work settings.				
15.	I feel uncomfortable at the sight of computer.				
16.	Every student has some level of computer anxiety				

Adapted from Heinssen, Glass, and Knight (1987). Assessing Computer Anxiety: Development and Validation of the Computer Anxiety Rating Scale. Computers in Human Behavior, 3

APPENDIX IV

QUESTIONNAIRE ON STUDENTS' PERCEIVED RELEVANCE OF MAP READING

INSTRUCTION: This questionnaire is designed to examine senior secondary school geography students' perception of relevance of geography and map reading. The data generated would be used for research purpose only and all information provided would be treated with complete confidentiality. Please tick √ the appropriate box that corresponds to your opinion.

SECTION A

Gender: Male ☐ Female ☐

Class: Science ☐ Social Science ☐ Commercial ☐

Age: Early Digital Natives (1980 – 1990) ☐ Late Digital Natives (1990 and above) ☐

SECTION B

SA – Strongly Agree **A – Agree** **D – Disagree** **SD – Strongly Disagree**

S/N	ITEMS	SA	A	D	SD	
1	I consider map reading as the most difficult aspect of geography.					
2	The features on the topographical map are actually located within our immediate environment.					
3	Participating in map reading classroom is a waste of time.					
4	Map reading would allow me to interact better with my environment.					
5	Skills from map reading would be useful both within and outside school environment.					
6	What I learn in map reading class has nothing to do with my out-of-school life.					
7	Map reading exposes me to ideas which I know I will need later on in my future career.					
8	Sometimes, I consider map reading as something I don't need for my higher education.					
9	Skills from map reading would allow me to identify features on the maps.					
10	I don't really need knowledge in map reading to understand my environment.					

APPENDIX V

Digital Storytelling In-depth Interview Guide for Geography Teachers

Name of Interviewer: …….....

Date: …….

The interviewer should formally introduce himself/herself to the teacher and also allow the teacher to introduce himself/herself.

My name is …….. and I am conducting a research project that aims at exploring the challenges and instructional benefits of integrating digital storytelling in classroom instruction. I would like to ask you some questions about your experience in using digital story package for classroom instruction.

I hope to use the information that you are going to contribute through this interview to address the following research questions: *"What are the lessons you have learnt in using digital storytelling for instruction? What are the major benefits that could be derived by geography teachers by using digital storytelling for instructional delivery? "* I will maintain confidentiality of all data collected.

The interview should take about 30 minutes. I would also like to record the conversation so that I can effectively capture your points and I just need to take short notes when necessary.

Question: What are the lessons you have learnt in using this strategy for instructional delivery?

Probes: Do students and teachers embrace this strategy? How would you describe your experience using this strategy?

Notes:

……

……

……

……

……

……

……

……

…

Question: Describe the major challenges that you faced while using digital storytelling for classroom instruction?

Probes: Do you consider digital storytelling as an important strategy to accomplish your lesson objectives? Would you say inadequate technology skill was a major constraint in using digital storytelling? Did you feel any sense of anxiety when computer was first introduced? Is this strategy not time consuming?

Notes:

……

……

……

……

……

……

……

……..

..

Question: How can teachers overcome these challenges?

Probes: What difference can training make? Do you think pre-service teachers should be exposed to using different digital tools for instruction during their teacher training programme?

Notes:

……

……

……

……

……

……

……

……

…

Question: What are the benefits in using digital storytelling for instruction? Is there anything you would like me to explain? What would you like to tell me that you've thought about during this interview?

Notes:

……

……

……

……

……

……

……

……

…

……

……

……

……

APPENDIX VI

Focus Group Discussion (FGD) for Geography Students

Instruction: This instrument allows geography students to bear their minds on what they have experienced during the period of using digital storytelling for map reading activities. Students are to be allowed to interact in groups and share opinions on how digital storytelling has changed their learning process. Group leaders in the story circles would aggregate the collective opinions of the members and write in the space provided after each question.

Question One: What is your general opinion about the use of digital storytelling for map reading activities in the classroom?

……

……

……

……

……

……

Question Two: Do students embrace the use of this strategy for instruction?

……

……

……

……

……

……

Question Three: What are the challenges faced in using digital storytelling for instruction?

……

……

……

……

……

…….....

.....

Question Four: What were the lessons learnt by participating in digital storytelling classroom?

……

……

……

……

……

……

……

……

……

……

Question Five: What are the benefits you think digital storytelling has added to your map reading classroom?

……

……

……

……

……

……

……

……

…

Question Six: Describe your general experience from digital storytelling classroom.

……

……

……

……

……

……

……

……

…

APPENDIX VII

Group-Based Digital Storytelling Lesson Plan Format (Teacher's Guide)

Class: ……. **Population:** …….. **Duration:** ……

Description: This template affords teacher the opportunity to seamlessly integrate group-based digital storytelling strategy into classroom instruction.

Topic: …….

Sub-Topic: ……..

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) …… ……

(ii) …… ……

(iii) …… ……

(iv) …… ……....

Step I Story Circles: follow these steps:

- Divide the class into groups of 5 or 6 students
- Make sure each group has at least one computer to watch the story
- Let them watch the story together and collectively make meaning out of the content

Collaboration and teamwork are the hallmarks of group-based digital storytelling strategy.

Step II Introduction: The teacher describes what the topic is all about and specifically informs students how they would learn the content through digital storytelling. At this point, the teacher needs to arouse the interest of the learners by briefly explaining to them how interesting it would be to learn the topic through digital storytelling and create friendly environment for the learners to express themselves.

Step III Dramatic Question: This question captures and sustains the attention of the learners throughout the story. It should a question that learners would be able to answer after watching the content of the digital storytelling package.

Step IV Presentation of the Content: Students are exposed to the content of the digital storytelling package by allowing them watch the story on the computers. It is advisable that students are allowed to watch the content at least twice to aid retention and understanding.

Step V Circle leaders are instructed to pause the video at every class activity, to allow group members write down the class activities.

Step VI Class Activities: At the end of the story, students discuss in groups (story circles) and execute the class activities within the story. The circle leaders are instructed to write down the aggregate opinions of the group members in the digital storytelling worksheet provided.

Step VII Feedback: Circle leaders submit the worksheets to the teacher to ascertain how far students have learnt the instructional content.

Step VIII Summary and Evaluation: Students respond to teacher's question and teacher also provides additional on the topic. Students are also asked to answer the dramatic question that was posed at the beginning of the lesson. If they are able to answer the question, then, the teacher could go on and conclude the lesson. Otherwise, students should be allowed to watch the content again with teacher providing insight into some salient points in the story.

Group-Based Digital Storytelling Lesson Plan (Lesson One)

Class: SS II **Population**: 52 **Duration**: 40 minutes

Topic: Identification of Features on Topographical Map

Sub-Topic: Identification of Features on Topographical Map (Valley)

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) define the term "valley"

(ii) differentiate between wet and dry valley

(iii) explain the process of identifying valley on the topographical map

Step I Story Circles: follow these steps:

- Divide the class into groups of 5 or 6 students
- Make sure each group has at least one computer to watch the story
- Let them watch the story together and collectively make meaning out of the content

Collaboration and teamwork are the hallmarks of group-based digital storytelling strategy.

Step II Introduction: The teacher describes how students would be able to learn the concept of valley through digital storytelling strategy and creates friendly environment to stimulate their interest.

Step III Dramatic Question: The teacher asks the following dramatic question to sustain students' interest throughout the class- How would you describe a valley?

Step IV Presentation of the Content: Students are exposed to the content of the digital storytelling package by allowing them watch the story on the computers. Students watch the concept of valley on the computers twice during the lesson

Step V Circle leaders are instructed to pause the video at every class activity, to allow group members write down the class activities. The following class activities were executed during the class:

(a) In your digital storytelling worksheet, describe how valleys could be identified on topographical map.

(b) In not more than five sentences, summarise what you have learnt about valley in this story.

Step VI Class Activities: At the end of the story, students discuss in groups (story circles) and execute the class activities within the story. The circle leaders are

instructed to write down the aggregate opinions of the group members in the digital storytelling worksheet provided.

Step VII Feedback: Circle leaders submit the worksheets to the teacher to ascertain how far students have learnt the instructional content.

Step VIII Summary and Evaluation: Students respond to teacher's question and teacher also provides additional on the concept of valley. Students are also asked to answer the dramatic question that was posed at the beginning of the lesson. If they are able to answer the question, then, the teacher could go on and conclude the lesson. Otherwise, students should be allowed to watch the content again with teacher providing insight into some salient points in the story.

Group-Based Digital Storytelling Lesson Plan (Lesson Two)

Class: SS II **Population**: 52 **Duration**: 40 minutes

Topic: Identification of Features on Topographical Map

Sub-Topic: Identification of Features on Topographical Map (Spur)

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) define the term "spur" on topographical map

(ii) distinguish between valley and spur on topographical map

(iii) explain the process of identifying spur on the topographical map

Step I Story Circles: follow these steps:

- Divide the class into groups of 5 or 6 students
- Make sure each group has at least one computer to watch the story
- Let them watch the story together and collectively make meaning out of the content

Collaboration and teamwork are the hallmarks of group-based digital storytelling strategy.

Step II Introduction: The teacher describes how students would be able to learn the concept of spur through digital storytelling strategy and creates friendly environment to stimulate their interest.

Step III Dramatic Question: The teacher asks the following dramatic question to sustain students' interest throughout the class- How would you identify spur on topographical map?

Step IV Presentation of the Content: Students are exposed to the content of the digital storytelling package by allowing them watch the story on the computers. Students watch the concept of spur on the computers twice during the lesson.

Step V Circle leaders are instructed to pause the video at every class activity, to allow group members write down the class activities. The following class activities were executed during the class:

(a) Why do you Busayo used to understand topics in map reading better than his friend?

(b) Based on what you have learnt so far, briefly differentiate between spurs and valleys on topographical map.

(c) Summarise what you have learnt on the identification of spur on topographical map

Step VI Class Activities: At the end of the story, students discuss in groups (story circles) and execute the class activities within the story. The circle leaders are instructed to write down the aggregate opinions of the group members in the digital storytelling worksheet provided.

Step VII Feedback: Circle leaders submit the worksheets to the teacher to ascertain how far students have learnt the concept of spur on topographical map.

Step VIII Summary and Evaluation: Students respond to teacher's question and teacher also provides additional on the identification of spur on topographical map. Students are also asked to answer the dramatic question that was posed at the beginning of the lesson. If they are able to answer the question, then, the teacher could go on and conclude the lesson. Otherwise, students should be allowed to watch the content again with teacher providing insight into some salient points in the story.

Group-Based Digital Storytelling Lesson Plan (Lesson Three)

Class: SS II **Population:** 52 **Duration:** 40 minutes

Topic: Identification of Features on Topographical Map

Sub-Topic: Identification of Features on Topographical Map (Ridges)

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) define the term "ridges" on topographical map

(ii) distinguish between valley and ridges on topographical map

(iii) explain the process of identifying ridges on the topographical map

Step I Story Circles: follow these steps:

- Divide the class into groups of 5 or 6 students
- Make sure each group has at least one computer to watch the story
- Let them watch the story together and collectively make meaning out of the content

Collaboration and teamwork are the hallmarks of group-based digital storytelling strategy.

Step II Introduction: The teacher describes how students would be able to learn the concept of ridges through digital storytelling strategy and creates friendly environment to stimulate their interest.

Step III Dramatic Question: The teacher asks the following dramatic question to sustain students' interest throughout the class- Why do you think students should find out features on topographical map in their environments?

Step IV Presentation of the Content: Students are exposed to the content of the digital storytelling package by allowing them watch the story on the computers. Students watch the concept of ridges on topographical map on the computers twice during the lesson.

Step V Circle leaders are instructed to pause the video at every class activity, to allow group members write down the class activities. The following class activities were executed during the class:

(a) Why do you think Darasimi was not usually pleased with idea of travelling to his hometown for any reason?

(b) In your words, describe how a ridge looks like and how you can identify this feature on topographical map.

(c) In not more than five sentences, summarise what you have learnt on the identification of ridges on topographical map.

Step VI Class Activities: At the end of the story, students discuss in groups (story circles) and execute the class activities within the story. The circle leaders are instructed to write down the aggregate opinions of the group members in the digital storytelling worksheet provided.

Step VII Feedback: Circle leaders submit the worksheets to the teacher to ascertain how far students have learnt the concept of ridges on topographical map.

Step VIII Summary and Evaluation: Students respond to teacher's question and teacher also provides additional on the identification of ridges on topographical map. Students are also asked to answer the dramatic question that was posed at the beginning of the lesson. If they are able to answer the question, then, the teacher could go on and conclude the lesson. Otherwise, students should be allowed to watch the content again with teacher providing insight into some salient points in the story.

Group-Based Digital Storytelling Lesson Plan (Lesson Four)

Class: SS II **Population**: 52 **Duration:** 40 minutes

Topic: Methods of Representing Relief on Topographical Map

Sub-Topic: Methods of Representing Relief on Topographical Map (Contour)

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) define contour lines on topographical map

(ii) identify contour lines on topographical map

(iii) describe how contour lines could be used to represent features on the topographical map

Step I Story Circles: follow these steps:

- Divide the class into groups of 5 or 6 students
- Make sure each group has at least one computer to watch the story
- Let them watch the story together and collectively make meaning out of the content

Collaboration and teamwork are the hallmarks of group-based digital storytelling strategy.

Step II Introduction: The teacher describes how students would be able to learn the concept of contour lines through digital storytelling strategy and creates friendly environment to stimulate their interest.

Step III Dramatic Question: The teacher asks the following dramatic question to sustain students' interest throughout the class- What is the relationship between contour lines on the map and landforms in learners' environments?

Step IV Presentation of the Content: Students are exposed to the content of the digital storytelling package by allowing them watch the story on the computers. Students watch the method of representing relief using contour lines on topographical map.

Step V Circle leaders are instructed to pause the video at every class activity, to allow group members write down the class activities. The following class activities were executed during the class:

(a) Briefly describe what contour lines represent on topographical map

(b) Why do you think Biola's brother decided to take around the community to show him some features.

(c) In not more than five sentences, summarise what you have learnt on representation of features on topographical map using contour lines

Step VI Class Activities: At the end of the story, students discuss in groups (story circles) and execute the class activities within the story. The circle leaders are instructed to write down the aggregate opinions of the group members in the digital storytelling worksheet provided.

Step VII Feedback: Circle leaders submit the worksheets to the teacher to ascertain how far students have learnt the concept of contour lines on topographical map.

Step VIII Summary and Evaluation: Students respond to teacher's question and teacher also provides additional on the representation of features using contour lines on topographical map. Students are also asked to answer the dramatic question that was posed at the beginning of the lesson. If they are able to answer the question, then, the teacher could go on and conclude the lesson. Otherwise, students should be allowed to watch the content again with teacher providing insight into some salient points in the story.

Group-Based Digital Storytelling Lesson Plan (Lesson Five)

Class: SS II **Population:** 52 **Duration**: 40 minutes

Topic: Representation of River

Sub-Topic: Representation of River and its Direction of Flow

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) explain how river could be identified on topographical map

(ii) describe the direction of flow of river on topographical map

(iii) highlight how contour lines determine the direction of flow of river on the topographical map

Step I Story Circles: follow these steps:

- Divide the class into groups of 5 or 6 students
- Make sure each group has at least one computer to watch the story
- Let them watch the story together and collectively make meaning out of the content

Collaboration and teamwork are the hallmarks of group-based digital storytelling strategy.

Step II Introduction: The teacher describes how students would be able to learn direction of flow of river through digital storytelling strategy and creates friendly environment to stimulate their interest.

Step III Dramatic Question: The teacher asks the following dramatic question to sustain students' interest throughout the class- How would contour lines determine the direction of flow of river on topographical map?

Step IV Presentation of the Content: Students are exposed to the content of the digital storytelling package by allowing them watch the story on the computers.

Step V Circle leaders are instructed to pause the video at every class activity, to allow group members write down the class activities. The following class activities were executed during the class:

(a) What determines the direction of flow of river on topographical map?

(b) In not more than five sentences, summarise what you have learnt on representation of river on topographical map using contour lines

Step VI Class Activities: At the end of the story, students discuss in groups (story circles) and execute the class activities within the story. The circle leaders are

instructed to write down the aggregate opinions of the group members in the digital storytelling worksheet provided.

Step VII Feedback: Circle leaders submit the worksheets to the teacher to ascertain how far students have learnt the concept of river representation on topographical map.

Step VIII Summary and Evaluation: Students respond to teacher's question and teacher also provides additional on representation of river using contour lines on topographical map. Students are also asked to answer the dramatic question that was posed at the beginning of the lesson. If they are able to answer the question, then, the teacher could go on and conclude the lesson. Otherwise, students should be allowed to watch the content again with teacher providing insight into some salient points in the story.

Group-Based Digital Storytelling Lesson Plan (Lesson Six)

Class: SS II **Population:** 52 **Duration:** 40 minutes

Topic: Intervisibility

Sub-Topic: Using Contour Lines to determine Intervisibility

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) define intervisibility of one place from another.

(ii) describe what could hinder intervisibility of one place from another.

(iii) Discuss the relationship between contour lines and intervisibility.

Step I Story Circles: follow these steps:

- Divide the class into groups of 5 or 6 students
- Make sure each group has at least one computer to watch the story
- Let them watch the story together and collectively make meaning out of the content

Collaboration and teamwork are the hallmarks of group-based digital storytelling strategy.

Step II Introduction: The teacher describes how students would be able to learn the concept of intervisibility through digital storytelling strategy and creates friendly environment to stimulate their interest.

Step III Dramatic Question: The teacher asks the following dramatic question to sustain students' interest throughout the class- How would you determine intervisibility of one place from another on topographical map?

Step IV Presentation of the Content: Students are exposed to the content of the digital storytelling package by allowing them watch the story on the computers.

Step V Circle leaders are instructed to pause the video at every class activity, to allow group members write down the class activities. The following class activities were executed during the class:

(a) Why do you think Adedayo was so confused about the topic?

(b) What could be used to determine the intervisibility of one place from another on topographical map?

(c) In not more than five sentences, discuss what you have learnt on the intervisibility of one place from another on topographical map.

Step VI Class Activities: At the end of the story, students discuss in groups (story circles) and execute the class activities within the story. The circle leaders are instructed to write down the aggregate opinions of the group members in the digital storytelling worksheet provided.

Step VII Feedback: Circle leaders submit the worksheets to the teacher to ascertain how far students have learnt the concept of intervisibility on topographical map.

Step VIII Summary and Evaluation: Students respond to teacher's question and teacher also provides additional on intervisibility using contour lines on topographical map. Students are also asked to answer the dramatic question that was posed at the beginning of the lesson. If they are able to answer the question, then, the teacher could go on and conclude the lesson. Otherwise, students should be allowed to watch the content again with teacher providing insight into some salient points in the story.

APPENDIX VIII

Individualised Digital Storytelling Lesson Plan Format (Teacher's Guide)

Class: ……. **Population:** …….. **Duration**: ……

Description: This template affords teacher the opportunity to seamlessly integrate individualized digital storytelling strategy into classroom instruction.

Topic: …….

Sub-Topic: ……..

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) ……

(ii) ……

(iii) ……

Step I Preparation Stage: Students have individual access to the digital storytelling package at least 24hrs to the class through school computers.

Step II: Students are instructed to write down the dramatic question and execute class activities individually at their own pace in the digital storytelling worksheet provided.

Step III Introduction: Students discuss what they have watched before the class. It is a whole class discussion and members of the class interact and discuss the content of the story.

Step IV Teaching Phase: Students are given additional information by the teacher after class discussion.

Step V Feedback: Students submit their digital storytelling worksheets to ascertain how far they have learnt the instructional content.

Step VI Summary and Evaluation: Teacher responds to students questions and provides additional information on the topic. Students are instructed to answer the dramatic question that was posed at the beginning of the story.

Individualised Digital Storytelling Lesson Plan (Lesson One)

Class: SS II **Population**: 41 **Duration**: 40 minutes

Topic: Identification of Features on Topographical Map

Sub-Topic: Identification of Features on Topographical Map (Valley)

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) define the term "valley"

(ii) differentiate between wet and dry valley

(iii) explain the process of identifying valley on the topographical map

Step I Preparation Stage: Students have individual access to the digital storytelling package at least 24hrs to the class through school computers.

Step II: Students are instructed to write down the dramatic question and execute class activities individually at their own pace in the digital storytelling worksheet provided. The dramatic question is- How would you describe a valley?

The following class activities were executed by each student:

(a) In your digital storytelling worksheet, describe how valleys could be identified on topographical map.

(b) In not more than five sentences, summarise what you have learnt about valley in this story.

Step III Introduction: Students discuss what they have watched before the class. It is a whole class discussion and members of the class interact and discuss the content of the story.

Step IV Teaching Phase: Students are given additional information by the teacher after class discussion.

Step V Feedback: Students submit their digital storytelling worksheets to ascertain how far they have learnt the concept of valley on topographical map.

Step VI Summary and Evaluation: Teacher responds to students questions and provides additional information on the topic. Students are instructed to answer the dramatic question that was posed at the beginning of the story.

Individualised Digital Storytelling Lesson Plan (Lesson Two)

Class: SS II **Population:** 41 **Duration:** 40 minutes

Topic: Identification of Features on Topographical Map

Sub-Topic: Identification of Features on Topographical Map (Spur)

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) define the term "spur" on topographical map

(ii) distinguish between valley and spur on topographical map

(iii) explain the process of identifying spur on the topographical map

Step I Preparation Stage: Students have individual access to the digital storytelling package at least 24hrs to the class through school computers.

Step II: Students are instructed to write down the dramatic question and execute class activities individually at their own pace in the digital storytelling worksheet provided. The dramatic question is- How would you identify spur on topographical map?

The following class activities were executed by each student:

(a) Why do you Busayo used to understand topics in map reading better than his friend?

(b) Based on what you have learnt so far, briefly differentiate between spurs and valleys on topographical map.

(c) Summarise what you have learnt on the identification of spur on topographical map

Step III Introduction: Students discuss what they have watched before the class. It is a whole class discussion and members of the class interact and discuss the content of the story.

Step IV Teaching Phase: Students are given additional information by the teacher after class discussion.

Step V Feedback: Students submit their digital storytelling worksheets to ascertain how far they have learnt the concept of spur on topographical map.

Step VI Summary and Evaluation: Teacher responds to students questions and provides additional information on the topic. Students are instructed to answer the dramatic question that was posed at the beginning of the story.

Individualised Digital Storytelling Lesson Plan (Lesson Three)

Class: SS II **Population:** 41 **Duration:** 40 minutes

Topic: Identification of Features on Topographical Map

Sub-Topic: Identification of Features on Topographical Map (Ridges)

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) define the term "ridges" on topographical map

(ii) distinguish between valley and ridges on topographical map

(iii) explain the process of identifying ridges on the topographical map

Step I Preparation Stage: Students have individual access to the digital storytelling package at least 24hrs to the class through school computers.

Step II: Students are instructed to write down the dramatic question and execute class activities individually at their own pace in the digital storytelling worksheet provided. The dramatic question is- Why do you think students should find out features on topographical map in their environments?

The following class activities were executed by each student:

(a) Why do you think Darasimi was not usually pleased with idea of travelling to his hometown for any reason?

(b) In your words, describe how a ridge looks like and how you can identify this feature on topographical map.

(c) In not more than five sentences, summarise what you have learnt on the identification of ridges on topographical map.

Step III Introduction: Students discuss what they have watched before the class. It is a whole class discussion and members of the class interact and discuss the content of the story.

Step IV Teaching Phase: Students are given additional information by the teacher after class discussion.

Step V Feedback: Students submit their digital storytelling worksheets to ascertain how far they have learnt the concept of ridges on topographical map.

Step VI Summary and Evaluation: Teacher responds to students questions and provides additional information on the topic. Students are instructed to answer the dramatic question that was posed at the beginning of the story.

Individualised Digital Storytelling Lesson Plan (Lesson Four)

Class: SS II **Population**: 41 **Duration:** 40 minutes

Topic: Methods of Representing Relief on Topographical Map

Sub-Topic: Methods of Representing Relief on Topographical Map (Contour)

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) define contour lines on topographical map

(ii) identify contour lines on topographical map

(iii) describe how contour lines could be used to represent features on the topographical map

Step I Preparation Stage: Students have individual access to the digital storytelling package at least 24hrs to the class through school computers.

Step II: Students are instructed to write down the dramatic question and execute class activities individually at their own pace in the digital storytelling worksheet provided. The dramatic question is- What is the relationship between contour lines on the map and landforms in learners' environments?

The following class activities were executed by each student:

(a) Briefly describe what contour lines represent on topographical map

(b) Why do you think Biola's brother decided to take around the community to show him some features.

(c) In not more than five sentences, summarise what you have learnt on representation of features on topographical map using contour lines

Step III Introduction: Students discuss what they have watched before the class. It is a whole class discussion and members of the class interact and discuss the content of the story.

Step IV Teaching Phase: Students are given additional information by the teacher after class discussion.

Step V Feedback: Students submit their digital storytelling worksheets to ascertain how far they have learnt the concept of representation of relief on topographical map.

Step VI Summary and Evaluation: Teacher responds to students questions and provides additional information on the topic. Students are instructed to answer the dramatic question that was posed at the beginning of the story.

Individualised Digital Storytelling Lesson Plan (Lesson Five)

Class: SS II **Population**: 41 **Duration:** 40 minutes

Topic: Representation of River

Sub-Topic: Representation of River and its Direction of Flow

Instructional Objectives: At the end of the lesson, students in the class should be able to;

Topic: Representation of River

Sub-Topic: Representation of River and its Direction of Flow

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) explain how river could be identified on topographical map

(ii) describe the direction of flow of river on topographical map

(iii) highlight how contour lines determine the direction of flow of river on the topographical map

Step I Preparation Stage: Students have individual access to the digital storytelling package at least 24hrs to the class through school computers.

Step II: Students are instructed to write down the dramatic question and execute class activities individually at their own pace in the digital storytelling worksheet provided. The dramatic question is- How would contour lines determine the direction of flow of river on topographical map?

The following class activities were executed by each student:

(a) What determines the direction of flow of river on topographical map?

(b) In not more than five sentences, summarise what you have learnt on representation of river on topographical map using contour lines.

Step III Introduction: Students discuss what they have watched before the class. It is a whole class discussion and members of the class interact and discuss the content of the story.

Step IV Teaching Phase: Students are given additional information by the teacher after class discussion.

Step V Feedback: Students submit their digital storytelling worksheets to ascertain how far they have learnt the concept of representation of river on topographical map.

Step VI Summary and Evaluation: Teacher responds to students questions and provides additional information on the topic. Students are instructed to answer the dramatic question that was posed at the beginning of the story.

Individualised Digital Storytelling Lesson Plan (Lesson Six)

Class: SS II **Population**: 41 **Duration:** 40 minutes

Topic: Intervisibility

Sub-Topic: Using Contour Lines to determine Intervisibility

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) define intervisibility of one place from another.

(ii) describe what could hinder intervisibility of one place from another.

(iii) Discuss the relationship between contour lines and intervisibility.

Step I Preparation Stage: Students have individual access to the digital storytelling package at least 24hrs to the class through school computers.

Step II: Students are instructed to write down the dramatic question and execute class activities individually at their own pace in the digital storytelling worksheet provided. The dramatic question is- How would you determine intervisibility of one place from another on topographical map?

The following class activities were executed by each student:

(a) Why do you think Adedayo was so confused about the topic?

(b) What could be used to determine the intervisibility of one place from another on topographical map?

(c) In not more than five sentences, discuss what you have learnt on the intervisibility of one place from another on topographical map.

Step III Introduction: Students discuss what they have watched before the class. It is a whole class discussion and members of the class interact and discuss the content of the story.

Step IV Teaching Phase: Students are given additional information by the teacher after class discussion.

Step V Feedback: Students submit their digital storytelling worksheets to ascertain how far they have learnt the concept of intervisibility on topographical map.

Step VI Summary and Evaluation: Teacher responds to students questions and provides additional information on the topic. Students are instructed to answer the dramatic question that was posed at the beginning of the story.

APPENDIX IX

Conventional Method Lesson Plan Format (Teacher's Guide)

Class: ……. Population: …….. Duration: ……

Topic: …….

Sub-Topic: ……..

Instructional Objectives: At the end of the lesson, students in the class should be able to;

(i) ……

(ii) ……

(iii) ……

Previous Knowledge: The teacher asks questions on the last topic to ascertain students' entry behavior.

Step I Introduction: The teacher introduces the topic to the students to allow them have an idea of what the concept is all about.

Step II Presentation I: The teacher gives detailed information on the topic and students write down the notes in their notebooks.

Step III Presentation II: The teacher gives note on the topic and use instructional materials like topographical map to convey the instructional content.

Step IV Conclusion: The teacher concludes the lesson by asking questions on the topic to ascertain how far students have learnt the instructional content.

Step V Evaluation: The teacher gives assignment to students to prepare them for the next map reading class.

APPENDIX X

DIGITAL STORYTELLING EVALUATION RUBRIC

This rubric is designed to evaluate digital storytelling package by teachers and students across all levels of education.

Criteria	Definition of the criteria	Needs Improvement 1	Average 2	Good 3	Excellent 4
The Overall Purpose of the Story	Aim(s) and Objective(s) of the story.	It is difficult to figure out the purpose of the story.	The content fairly revealed the purpose of the story.	Establishes a purpose early enough and maintains focus for a substantial part of the story.	Establishes a purpose early on and maintains a clear focus throughout.
Dramatic Question	Question which makes the main point of the story.	Little effort is made to answer the dramatic question.	A dramatic question is hinted at but not clearly established within the context of the story.	A dramatic question is asked but not clearly answered within the context of the story.	A meaningful dramatic question is asked and answered within the story context.
Pacing of Narrative	The rate at which the events proceed.	No attempt to match the pace of the narratives to the story line. The rhythm is either too fast or too slow.	Tries to make an accurate order for the events, but it is often noticeable that the pacing does not fit the story line.	The order of the events matches story line and relatively engaging for the audience. The rhythm is sometimes fast or slow.	The order of the events matches the story line and helps the audience really "get into" the story. The rhythm is neither too fast nor too slow.
Creation of Story around the Content	The ability to create stories around different contents in the curriculum.	Little effort is made to create story around the contents.	Makes attempt to create story around the content with relevant multimedia content (ex. photo with video), but it	Creates story around a substantial part of the content and relevant multimedia contents are mixed(ex. photo with video)	Content is clearly relevant to the story and multimedia contents match different parts of the story.

			needs more work.		
Grammar and Language Usage	Complexity of the language	Repeated errors in grammar and language usage greatly distract the audience from the story.	Grammar and language usage are typically correct but some errors are present in the story.	Grammar and language usage are typically correct with minimal errors in the story.	Grammar and language usage are correct and contribute to clarify the digital story.
Technological Competence	Competence in the use of different features in the digital tool platforms like effect, transition and animation.	No transitions, effects, animations, and editing tools are used throughout the story.	Some transitions, effects, animations, and edits are used and/or appropriate to the subject matter	Most transitions, effects, animations, and edits are used and they are appropriate to the subject matter.	Transitions, effects, animations, and edits are utilised and they are quite appropriate to the subject matter.
Image Quality	The quality of image and its alignment with the text	The images/pictures are blurred and overlap the text. The images cannot be clearly seen by the audience throughout the story.	Images are blurred and overlap the text in some sections of the story.	Images/pictures are clear throughout the story but there are some overlaps.	The images are consistently clear and there are no overlaps throughout the story.
Emotional Content	The range of emotions	Audience has little emotional engagement.	Audience lapse in emotional engagement.	Audience is emotionally engaged throughout the digital storytelling.	Audience is deeply and emotionally engaged throughout the digital storytelling.
Voice Quality	Clarity of the voice throughout the story.	The voiceover is practically not audible throughout the story.	The voice quality is poor in substantial parts of the story.	Voiceover is clear enough in major parts of the story.	The voice clarity is absolutely fantastic and audible enough throughout the story.

Economy of the Story Details	Optimization of the content and quality. The length of the story.	The story needs extensive editing. It is either too short or too long to be interesting and sustain focus.	The story needs editing. It is rather too long or too short in more than one section.	The story composition is typically good, though it seems to drag somewhat in one or two sections	The story is told with the right amount of details. It is neither too short nor too long throughout.
Final Score					

Digital Storytelling Rubric (Based on Several Rubrics posted Online at http://rubistar.4teachers.org)

Note: The maximum score is 40 while the minimum score is 10.

Criteria	Description
The Overall Purpose of the Story	These are the introductory statements that describe the main purpose of the story. This part of the story reveals the teachers' objectives for creating the content of digital storytelling package.
Dramatic Question	This is the question that would be posed to the students before watching the content of the story. It should be a question that would reveal the whole essence of the story and keep learners in suspense throughout the content. Without being told, students should be able to answer the question after watching the story.
Pacing of Narrative	This is the rhythm of narration and shows the consistency and frequency of events in the story. It shows how fast or slow the storyteller reads the script and explain different concepts in the story.
Creation of Story around the Content	Generally, the main reason for instructional storytelling is to present a particular content in story form. Thus, this aspect has to do with the ability of storyteller to effectively capture different concepts in the topic with a story.
Grammar and Language Usage	Storytellers are not to impress the audience with complex vocabulary and ambiguous words because they might not be there when learners would watch the story. Therefore, the language should remain simple and unambiguous. The sentences should be structured in such a way that all the learners, for which the story was made, would easily understand.
Technological Competence	This has to do with the ability of the teacher to effectively use the features on the digital tool interface to mix and create the story. These features include transition, effects, adjustment of the picture size, editing tools and so on.
Image Quality	Image gives additional information to the story and it needs to be very

	clear. If text and picture appear on the same slide, the text should be aligned in such a way that it does not cover the picture. Few words are required on the slide and even some slides could be without any text.
Emotional Content	The content of the story needs to emotionally engage the learners in the concepts that are being taught. It should be a package that could arouse interest of the learners on the concepts.
Voice Quality	The narration or voiceover that would accompany the story should be clearly audible. Learners need to understand clearly, the message the storyteller is passing across.
Economy of the Story Details	This has to do with the judicious use of resources to create digital storytelling. The teacher needs to be moderate in the use of media and other resources during the process of creating story. The story content should be neither too long nor too short.

APPENDIX XI

QUESTIONNAIRE ON GEOGRAPHY TEACHERS IDENTIFICATION OF DIFFICULT TOPICS MAP READING

INSTRUCTION: This questionnaire is designed for geography teachers to identify difficult areas to teach in SS 2 map reading. The intention is to develop a technology-based intervention strategy that could demystify this concept and make map reading more interesting and connected to real life situation. The data generated would be used for research purpose only and all information provided would be treated with complete confidentiality.

Please tick ( ) the appropriate box that corresponds to your opinion.

SECTION A

Background Information

Name of the School ……

Gender: Male ( ) Female ( )

Year of Experience: 0-9 Years ( ) 10-19 Years ( ) 20-29 Years ( ) 30 Years and above ( )

Age:20-29 Years ( ) 30-39 Years ( ) 40-49 ( ) Years ( )50-59 Years ( ) 60 Years and above ( )

SECTION B

Difficult areas in Map Reading for Geography Teachers to Teach

VD- Very Difficult D- Difficult LD- Less Difficult ND- Not Difficult

S/N	Topics	VD	D	LD	ND
1	Identification of features on topographical map (Valley)				
2	Identification of features on topographical map (Spur)				
3	Identification of features on topographical map (Pass)				
4	Identification of features on topographical map (Knoll)				
5	Identification of features on topographical map (Conical Hills)				
6	Identification of features on topographical map (Ridges)				
7	Methods of representing relief on topographical map (Contour)				
8	Methods of representing relief on topographical map (Hill Shading)				
9	Methods of representing relief on topographical map (Relief Colouring)				
10	Methods of representing relief on topographical map (Spot Height)				
11	Methods of representing relief on topographical map (Hachure)				
12	The major cardinal points (True and Magnetic North)				
13	Inter-visibility				
14	Angular bearing and compass direction				

APPENDIX XII

QUESTIONNAIRE ON STUDENTS IDENTIFICATION OF DIFFICULT TOPICS IN SENIOR SECONDARY SCHOOL 11 MAP READING

INSTRUCTION: This questionnaire is designed for geography students to identify difficult areas to learn in SS 2 map reading. The intention is to develop an instructional package that could simplify this concept and make map reading more interesting and connected to real life situation. The data generated would be used for research purpose only and all information provided would be treated with complete confidentiality.

Please tick ( ) the appropriate box that corresponds to your opinion.

SECTION A

Background Information

Name of the School ……

Gender: Male ( ) Female ( )

Age: 14-15 Years ( ) 16-17 Years ( ) 18 Years and above ( )

SECTION B

Difficult areas in Map Reading for Geography students

VD- Very Difficult D- Difficult LD- Less Difficult ND- Not Difficult

S/N	Topics	VD	D	LD	ND
1	Identification of features on topographical map (Valley)				
2	Identification of features on topographical map (Spur)				
3	Identification of features on topographical map (Pass)				
4	Identification of features on topographical map (Knoll)				
5	Identification of features on topographical map (Conical Hills)				
6	Identification of features on topographical map (Ridges)				
7	Methods of representing relief on topographical map (Contour)				
8	Methods of representing relief on topographical map (Hill Shading)				
9	Methods of representing relief on topographical map (Relief Colouring)				
10	Methods of representing relief on topographical map (Spot Height)				
11	Methods of representing relief on topographical map (Hachure)				
12	The major cardinal points (True and Magnetic North)				
13	Inter-visibility				
14	Angular bearing and compass direction				

APPENDIX XIII

The Results of Difficult Topics in Map Reading

S/N	Difficult Topics in Map Reading	Teachers		Students	
		VD	D	VD	D
1	Identification of features on topographical map (Valley)	21%	31%	32%	40%
2	Identification of features on topographical map (Spur)	30%	28%	32%	39%
3	Identification of features on topographical map (Pass)	20%	18%	32%	39%
4	Identification of features on topographical map (Knoll)	17%	20%	28%	21%
5	Identification of features on topographical map (Conical Hills)	10%	14%	31%	22%
6	Identification of features on topographical map (Ridges)	32%	29%	37%	32%
7	Methods of representing relief on topographical map (Contour)	27%	31%	41%	27%
8	Methods of representing relief on topographical map (Hill Shading)	17%	13%	36%	29%
9	Methods of representing relief on topographical map (Relief Colouring)	13%	25%	22%	19%
10	Methods of representing relief on topographical map (Spot Height)	12%	10%	22%	30%
11	Representation of river and its direction of flow	21%	29%	31%	20%
12	The major cardinal points (True and Magnetic North)	12%	12%	21%	19%
13	Inter-visibility	25%	26%	23%	31%
14	Angular bearing and compass direction	20%	11%	14%	23%

VD- Very Difficult D- Difficult

Table 1.3 Difficult Topics in Map Reading (Areas of Overlap for Teachers and Students)

S/N	Difficult Topics in Map Reading	Teachers		Students	
		VD	D	VD	D
1.	Identification of features on topographical map (Valley)	21%	31%	32%	40%
2.	Identification of features on topographical map (Spur)	30%	28%	32%	39%
3.	Identification of features on topographical map (Ridges)	32%	29%	37%	32%
4.	Methods of representing relief on topographical map (Contour)	27%	31%	41%	27%
5.	Representation of river and its direction of flow	21%	29%	31%	20%
6.	Inter-visibility	25%	26%	23%	31%

VD- Very Difficult D- Difficult

APPENDIX XIV

Digital Story Package Validation Sheet

Gender: Male ( ) Female ( )

Date: ……..

Story Title:

……

Criteria	**Rating**			**Comments**
	Good	Satisfactory	Poor	
Point of View Purpose of the story. It addresses specific points.				**Story 1**:…… …… …… **Story 2**:…… …… …… **Story 3**:…… …… …… **Story 4**:…… …… …… **Story 5**:…… …… …… **Story 6**:…… …… ……
Story Content The appropriateness of the story. Effective use of the story to capture content.				**Story 1**:…… …… …… **Story 2**:…… …… ……

				..... **Story 3**:…… …… …… ..... **Story 4**:…… …… …… ..... **Story 5**:…… …… …… ..... **Story 6**:…… …… …… .....
Clarity of Voice The story content is audible. Limited background noise				**Story 1**:…… …… …… ..... **Story 2**:…… …… …… ..... **Story 3**:…… …… …… ..... **Story 4**:…… …… …… ..... **Story 5**:…… …… …… ..... **Story 6**:…… …… …… .....
Engagement				**Story 1**:…… ……

Interesting Thought-Provoking Appropriateness of the activities within the story				…… **Story 2**:…… …… **Story 3**:…… …… **Story 4**:…… …… **Story 5**:…… …… **Story 6**:…… ……
Video Quality Clear Pictures Appropriate Videos				**Story 1**:…… …… **Story 2**:…… …… **Story 3**:…… …… **Story 4**:…… …… **Story 5**:…… …… **Story 6**:…… ……

				…….. ……..
Voicing Good Pacing Well Spoken Appropriate Soundtrack				**Story 1**:…… …… …….. ……..
				Story 2:…… …… …….. ……..
				Story 3:…… …… …….. ……..
				Story 4:…… …… …….. ……..
				Story 5:…… …… …….. ……..
				Story 6:…… …… …….. ……..
Technical Quality Appropriate Transitions Moderate Callouts				**Story 1**:…… …… …….. ……..
				Story 2:…… …… …….. ……..
				Story 3:…… …… …….. ……..
				Story 4:…… …… …….. ……..

				Story 5:…… …… ……..... ..... **Story 6**:…… …… ……..... .....
General Remarks:				

APPENDIX XV

Digital Storytelling Worksheet

Story Title: …….

Instruction: Please respond to the class activities within the story in this worksheet. It is important that every member of the group participates in these activities as it will help you to be properly engaged in the learning content.

Class Activity 1:

……
……
……
……
……
……
……

Class Activity 2:

……
……
……
……
……
……
……

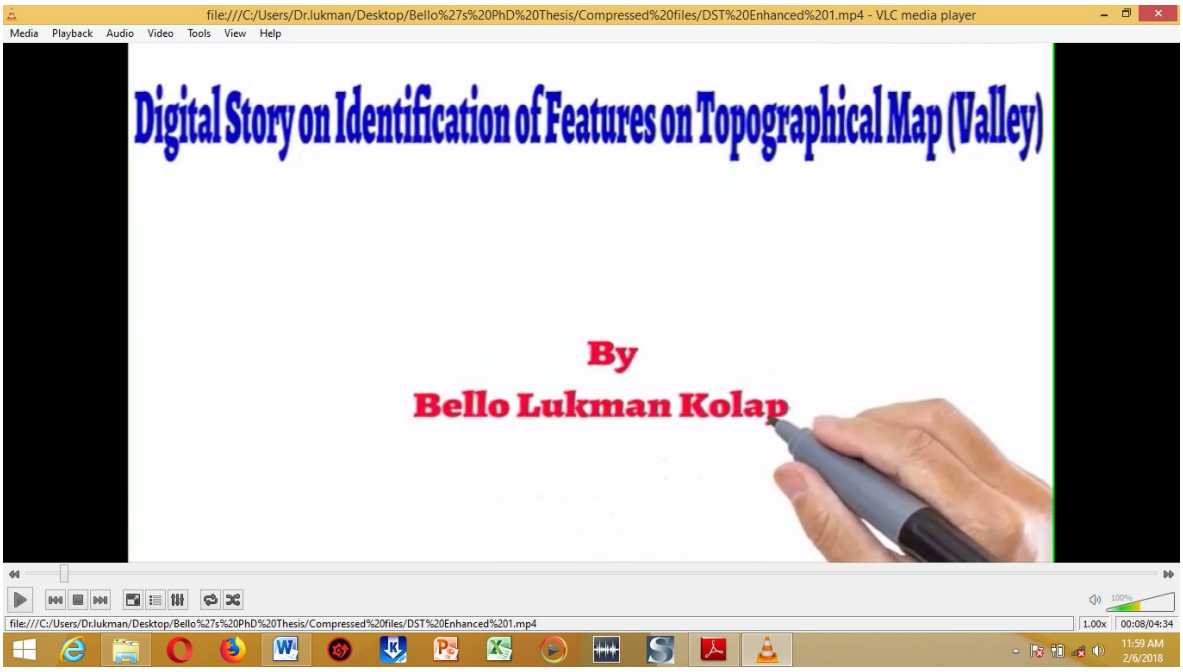
Class Activity 3:

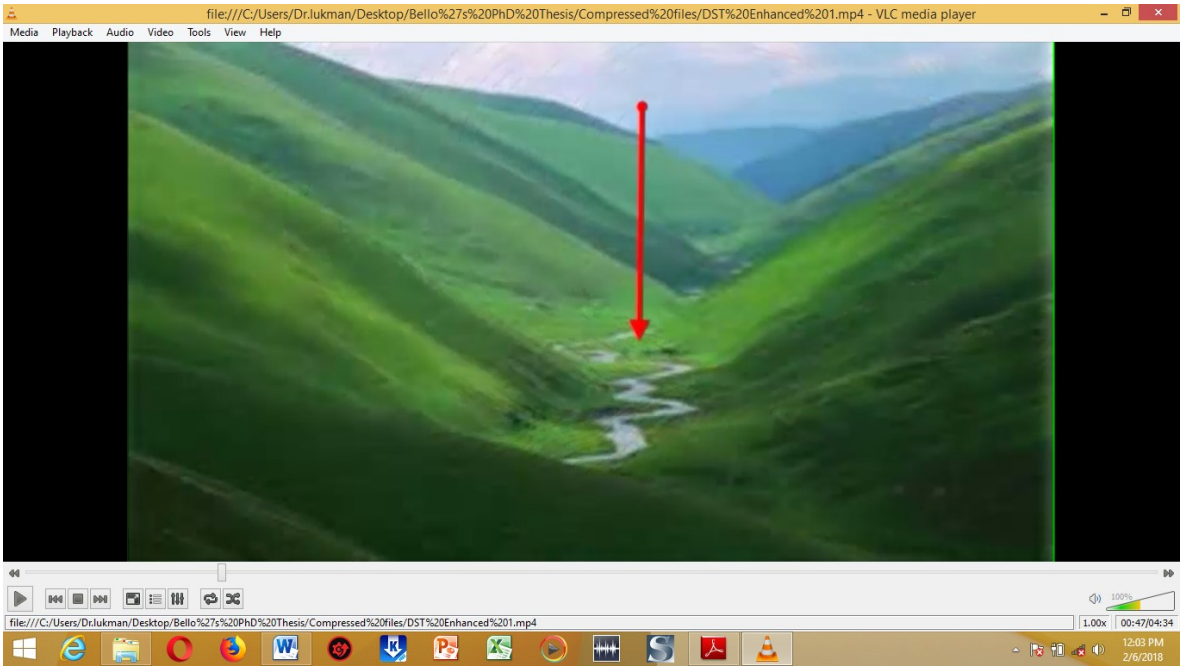
……
……
……
……
……
……
……

Class Activity 4:

……
……
……
……
……
……
……
……
…….

SCREENSHOTS FROM THE DIGITAL STORYTELLING PACKAGE






file:///C:/Users/Dr.lukman/Desktop/Bello%27s%20PhD%20Thesis/Compressed%20files/DST%20Enhanced%204.mp4 - VLC media player
Media Playback Audio Video Tools View Help
file:///C:/Users/Dr.lukman/Desktop/Bello%27s%20PhD%20Thesis/Compressed%20files/DST%20Enhanced%204.mp4
1.00x
02:51/03:30
12:43 PM
2/6/2018

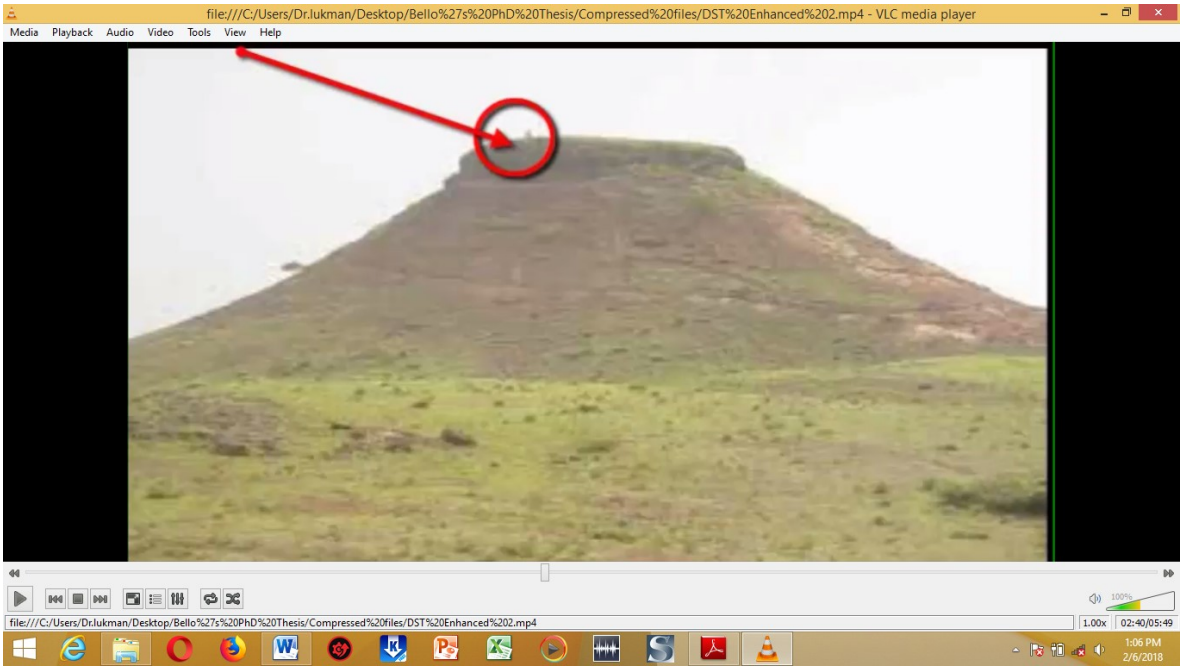

file:///C:/Users/Dr.lukman/Desktop/Bello%27s%20PhD%20Thesis/Compressed%20files/DST%20Enhanced%202.mp4 - VLC media player
Media Playback Audio Video Tools View Help
file:///C:/Users/Dr.lukman/Desktop/Bello%27s%20PhD%20Thesis/Compressed%20files/DST%20Enhanced%202.mp4
1.00x
02:40/05:49
1:06 PM
2/6/2018

PHOTO GALLERY

STUDENTS RECEIVING INSTRUCTION BEFORE WATCHING THE PACKAGE

STUDENTS IN GROUP-BASED MODE WATCHING THE PACKAGE

STUDENTS IN INDIVIDUALISED MODE WATCHING THE PACKAGE