IMPACT OF GRAPHICS ON ACADEMIC PERFORMANCE OF JUNIOR SECONDARY SCHOOL STUDENTS IN SOCIAL STUDIES IN JIGAWA STATE, NIGERIA

BY

INUWA FARUK

DEPARTMENT OF EDUCATIONAL FOUNDATIONS AND CURRICULUM
FACULTY OF EDUCATION
AHMADU BELLO UNIVERSITY, ZARIA
NIGERIA

May, 2015

IMPACT OF GRAPHICS ON ACADEMIC PERFORMANCE OF JUNIOR SECONDARY SCHOOL STUDENTS IN SOCIAL STUDIES IN JIGAWA STATE, NIGERIA

BY

INUWA, Faruk
MED/EDUC/09790/2010-2011

A THESIS SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA NIGERIA

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTERS DEGREE IN EDUCATION (INSTRUCTIONAL TECHNOLOGY)

DEPARTMENT OF EDUCATIONAL FOUNDATIONS AND CURRICULUM, FACULTY OF EDUCATION
AHMADU BELLO UNIVERSITY, ZARIA NIGERIA

SUPERVISORS:

PROF. M. ABDULLAHI

PROF. S. SALAU

MAY, 2015

Declaration

I declare that this thesis entitled “Impact of Graphics on Academic Performance of Junior Secondary School Students in Social Studies in Jigawa State, Nigeria” was written by me in Department of Educational Foundations and Curriculum, Faculty of Education, Ahmadu Bello University, Zaria under the supervision of Prof. M. Abdullahi and Prof. S. Salau. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this work has been presented for another degree or diploma at this or any other institution.

_____ _____

Inuwa Faruk (Date)

Certification

This thesis entitled "IMPACT OF GRAPHICS ON ACADEMIC PERFORMANCE OF JUNIOR SECONDARY SCHOOL STUDENTS IN SOCIAL STUDIES IN JIGAWA STATE, NIGERIA" by Inuwa Faruk meets the regulations governing the award of the degree of Masters in Education (Instructional Technology) of the Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

_____ _____

Prof. M. Abdullahi (Date)
Chairman, Supervisory Committee

_____ _____

Prof. S. Salau (Date)
Member, Supervisory Committee

_____ _____

Dr. B. Maina (Date)
Head of Department

_____ _____

Prof. A. Z. Hassan (Date)
Head, School of Post graduate Studies

Dedication

To my mother, Maryam Abu-Bakr Sadiq

ACKNOWLEDGEMENTS

All praises are due to the Supreme Being – ALLAH the Almighty, for seeing me through the successful completion of this research work. My utmost appreciation goes to the project supervisors, Prof. M. Abdullahi and Prof. S. Salau, who have been extremely helpful in the standardisation of the research by reviewing the manuscripts, correcting and giving detailed experienced suggestions where necessary. I am also very grateful to my external examiner Prof. M.O. Yusuf (University of Ilorin), for his valuable contributions that helps immensely in the refinement of the research.

I wish to express my profound gratitude to Prof. A. T. Kadage, Dr. S. A. Zubairu Head, Instructional Technology Section, Department of Educational Foundations and Curriculum Studies, Ahmadu Bello University, Zaria., Dr. A. I. Mustapha, Dr. A. A. Dada, Dr. S. Muhammad, Dr R. A. Shittu and the entire academic staff of the Faculty of Education, A.B.U Zaria. I am indeed, grateful to them for giving me the privilege to tap from their fountains of knowledge and experiences. The scholarly contributions and objective criticisms they offered during seminar presentations have greatly helped to increase my knowledge in research work.

I also acknowledge the cooperation given to me by the Principals, Vice Principals, teachers, and students of the schools used in the study. I remain indebted to my employers, the Jigawa State Ministry of Education, Science, and Technology, for giving me the opportunity to undertake postgraduate studies at the university through in-service training.

Finally, I am grateful to family members, friends, and course mates for their prayers, understanding and encouragement throughout the period of my study. May Allah bless you all.

ABSTRACT

The study investigated the Impact of Graphics on Academic Performance of Junior Secondary School Students in Social Studies in Jigawa State, Nigeria. Three research questions and three null hypotheses were drawn to guide the study. Related literatures were reviewed after the conceptual framework on the major variables of the study. A quasi experimental research design involving pretest and posttest was used for the study. The population consisted of 948 JSS II students. Purposive sampling technique was applied to select the samples of 214 subjects made up of 158 male and 56 female students from four intact classes to form the control and experimental groups. The instruments used for data collection were graphics media learning package (GMLP), and Social Studies Academic Performance Test (SAPT) with reliability coefficient of 0.87. Mean and Standard Deviation was used to answer the research questions, while Independent Sample Test Statistics was used to test the hypotheses using Statistical Package for Social Science (SPSS, version 15.0). Findings from the study revealed that: There was significant difference in the mean scores of experimental and control group in favour of the experimental group. There was significant difference in the mean scores of rural and urban students exposed to graphic instructional media and there was no significant difference in the mean scores of male and female Social Studies students exposed to graphics as a teaching - learning strategy. The study recommended among others, that graphic instructional resources should be used for teaching both concrete and abstract concepts to students at Junior Secondary School level.

TABLE OF CONTENTS

Page

COVER PAGE i

TITLE PAGE ii

DECLARATION iii

CERTIFICATION iv

DEDICATION v

ACKNOWLEDGEMENTS vi

ABSTRACT vii

TABLE OF CONTENTS viii

LIST OF TABLES xi

LIST OF FIGURES xii

OPERATIONAL DEFINITION OF TERMS xiii

ABBREVIATIONS xiv

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study 1

1.2 Statement of the Problem 3

1.3 Objectives of the Study 4

1.4 Research Questions 5

1.5 Hypotheses 5

1.6 Basic Assumptions 5

1.7 Significance of the Study 6

1.8 Scope of the Study 7

CHAPTER TWO: REVIEW OF RELATED LITEATURE

2.1 Introduction 8

2.2 Conceptual Framework 8

2.3 Theoretical Framework 11

2.3.1 Relevance of Dual Coding Theory to the Study 15

2.4 Psychological Bases of Instructional Graphics 15

2.5 Nature, Scope and Objectives of Social Studies in Junior Secondary Schools 20

2.6 Rationale for Integrating Graphics in Teaching and learning 23

2.6.1 Static Graphics Used in Teaching and learning 27

2.6.2 Principles and Elements of Graphics Design 29

2.6.3 Instructional Applications of Graphics 32

2.7 Impact of Graphics on Learners' Memory 36

2.8 Empirical Studies 40

2.9 Summary 44

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction 45

3.2 Research Design 45

3.3 Population 46

3.4 Sample and Sampling Technique 48

3.5 Instrumentation 49

3.5.1 Validity of the Instrument 50

3.5.2 Pilot Study 51

3.5.3 Reliability of the Instrument 51

3.6 Procedure for Data Collection 51

3.6.1 Procedure for Treatment 51

3.7 Procedure for Data Analysis 55

CHAPTER FOUR: ANALYSIS, RESULTS, AND DISCUSSION

4.1 Introduction 56

4.2 Data analysis 56

4.2.1 Analysis of Research Questions 56

4.2.2 Hypotheses testing 59

4.3 Summary of Major findings 61

4.4 Discussion of Major findings 62

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction 65

5.2 Summary 65

5.3 Implication of the findings for Social Studies education 66

5.4 Conclusion 67

5.5 Recommendations 67

5.6 Suggestions for further studies 68

References 69

Appendices 76

LIST OF TABLES

Table	**page**
3.1: Study Population	47
3.2: Sample Selected for the Study	49
4.1: Impact of Graphics on Facilitating Students' Academic Performance	57
4.2 Impact of Graphics on Facilitating Academic Performance of Rural and Urban Students	57
4.3: Impact of Graphics on Facilitating Academic Performance of Male and Female Students	58
4.4: T-test Analysis of Mean Scores of Experimental Group and Control Group	59
4.5: T-test Analysis of Mean Scores of rural and urban Social Studies students exposed to graphics.	60
4.6: T-test Analysis of Mean Scores of Male and Female Students in the Experimental group	61

LIST OF FIGURES

Figure	**Page**
2.1 Verbal and nonverbal symbolic systems of Dual Coding Theory	12
2.2 Principles of graphics design	32
2.3: Percentages of Information retention	37

OPERATIONAL DEFINITION OF TERMS

The following terms are operationally defined in this study as:

Graphic Instructional Media - Visual presentations of objects or concepts on paper to facilitate in teaching and learning.

Performance – Academic attainment of students

Recall - The ability to recollect previously learned material.

ABBREVIATIONS

GIMLP – Graphic instructional Learning Package

JSS - Junior Secondary School

JSSCE - Junior Secondary School Certificate Examination

LGA – Local Government Area

MDGs – Millennium Development Goals

NERDC – National Educational Research and Development Council

NTI - National Teachers' Institute

SAPT - Social Studies Academic Performance Test

SPSS – Statistical Package for Social Science

SOSAN – Social Studies Association of Nigeria

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

The importance of education to the economic, and socio - political development of a multi – cultural country like Nigeria cannot be over-emphasised. The Social Studies curriculum is designed to enable students become responsible citizens and to lay a sound foundation for their subsequent study of related subjects such as Economics, History, Government, Geography, and Religious studies at higher levels of education (FRN, 2004). Dyel, 2011 observed that in spite of the various innovations introduced into the educational system, the attainment of the desired goals remain an illusion. This under-performance of students in Basic Social Studies is attributed to many factors such as; the constant use of the lecture method of teaching, the attitude of students and teachers towards the subject, difficulty in managing overcrowded classes due to rapid population growth and so on.

The use of the lecture method by teachers has been criticized by many researchers (Newby and Lai, 2008). This instructional method, according to them, is extremely didactic in approach, teacher-centered, and does not lead to meaningful learning. It can only encourage the development of passivity, docile learning and over-dependence on the teacher and on textbooks. Little effort is being made by teachers to supplement the oral instruction offered to learners with the integration of variety of graphic learning resources such as photographs, pictures, cartoons, to charts, maps, and diagrams.

Novak and Gowin (1984) observed that, the kind of strategies for teaching and learning which are capable of achieving the objectives of the school and society are those which emphasize on learners' creative skills and child centered Inquiry-based instruction. The

graphics based teaching is proposed in this study in order to investigate its impact, is one of the activity-based teaching strategy in which students work as a team in small groups while they share ideas and experiences in the process. This could lead to improved academic performance of students in school (Roberson, 2012).

Again, the fact that students learn, remember, perform, and understand learning tasks in different ways (Cherry, 2012) pose a challenge the educational system that assumes everyone learn the same material in the same way through delivering lesson content via oral instruction alone (Lane, 2012). The incorporation of graphics in a lesson enable teachers to present a visual - spatial representation of learning materials; this combined with oral instruction can facilitate learning among greater number of students. Also engaging the learners in the actual production of graphic visuals offer to students the opportunities for hands – on experience, which is one of the best ways to learn.

Clark and Lyons, (2004) identified differences in learners' characteristics such as; age, sex, and social background among the factors that influence students' academic achievements. To this end graphic resources could be employed to remedy some of these disparities among learners via promoting effective content delivery across the various segments of students. The integration of this valuable teaching strategy is often a neglected skill among a greater number of Nigeria junior secondary school teachers.

It was against this background that it becomes imperative to conduct further study on the Impact of Graphics on Academic Performance of Junior Secondary School Students in Social Studies.

1.2 Statement of the Problems

The application of graphics to present learning contents to students in Nigerian primary and junior secondary schools has been a challenging task to most teachers. Problems associated to the utilization of graphic instructional resources could stem up from different aspects – ranging from teachers' attitude to work, dispositions of school managements to use of instructional media, and a multitude of other factors.

A reasonable percentage of the teachers at basic level Nigeria educational system are not abreast to new trends and developments in the field of education. As a result, most of them lack the required knowledge about the peculiarities of graphics and the conditions in which they provide best results in learning. This may be attributed to the scantiness of literatures on the subject, and shortfall in refresher courses / workshops for the teachers.

Inadequacy of skills on design of graphic resources among teachers is also another area of concern. After the decision to present a learning content in visual form has been reached by a teacher, the problem of basic illustration techniques arise. The difficulty in physically forming an image on paper becomes so frustrating to some teachers that they give up the idea and all the potentials of visual communication is lost. The deficiency of knowledge about the principles and elements of graphic design, a nervous hand, and a dripping pen often force many teachers into the avenue of escape. Except for the few who have the advantage of training in drawing or have access to art services, creating visual image is one of most challenging problems in teaching.

The use of appropriate criteria for selection and application of graphics to learning tasks is essential. Unfortunately this is another area where most teachers are lagging

behind. This could be serious problem because no matter how good a graphic material is, it may not produce the desired impact unless it suits the learners' level of intelligence, prior knowledge, and learning styles. This is because while a particular graphic is helpful to some set of students, it could be distractive to others.

The lukewarm attitudes of some school managements towards providing necessary materials and encouragement to enable teachers improvise graphic visuals also deprives students from benefiting from the array of effective visual illustrations obtainable in textbooks and other printed sources. This ultimately undermines the academic achievements of students in junior secondary schools.

In view of the afore discussed problems, it becomes imperative to examine the impact of graphics on Academic Performance students in Social Studies at Junior Secondary School level to provide additional literature and empirical basis for teachers and school administrators to advance the cause of integrating graphics to teaching – learning process.

1.3 Objectives of the Study

The Objectives of the Study were as follows:

1. Find out the impact of graphics in facilitating the academic performance of students in Social Studies.
2. Determine the impact of graphics on the academic performance of rural and urban students in Social Studies.
3. Investigate the impact of graphics on the academic performance of male and female students in Social Studies.

1.4 Research Questions

The following were questions that guided the study:

1. What is the impact of graphics on facilitating students' academic performance in Social Studies?
2. What is the impact of graphics on facilitating academic performance of rural and urban students in Social Studies?
3. What is the impact of graphics on facilitating academic performance of male and female students in Social Studies?

1.5 Hypotheses

Based on the research questions the following null hypotheses were developed:

HO_1: There is no significant difference in the mean scores of Social Studies students between those exposed to graphics and their counterparts exposed to lecture method.

HO_2: There is no significant difference in mean scores of rural and urban students exposed to graphics in Social Studies.

HO_3: There is no significant difference in the mean scores of male and female Social Studies students exposed to graphics.

1.6 Basic Assumptions

The study was based on the following basic assumptions:

1. The effective use of graphics might promote effective teaching and learning.

2. That a good graphic instructional medium might enables the teacher to communicate concepts to some learners more vividly than in just words.
3. Graphics make the teaching- learning process student-centered thus enables the learners to recall lesson content better.

1.7 Significance of the Study

The findings of this research would be useful for the improvement of Nigerian Social Studies education in the following ways:

The study may serve as an insight to researchers, who might consult it in process of carrying out similar study in the future. Education students in colleges and universities may also find the study valuable when they consult it in the course of their studies. To school administrators, it will bring to the fore, the vital functions that graphics play in teaching-learning process especially as it relates to concretizing acquired knowledge and skills for long term memory.

Government may also find the study useful because it attempts to show areas where its intervention is required, such as greater commitment to issues like; re-training of teachers, provision of structures, and material resources/equipment that will promote effective teaching and learning. It is expected that government will further realize the potentialities of the various instructional materials as crucial tools to teachers for the attainment of instructional objectives and to that effect provide the needed financial and moral support to acquisition and proper utilization of such materials.

Curriculum planners and policy makers on education may also benefit from the study in such a way that when engaged in further review of curriculum, interest groups

such as nongovernmental organizations and students' associations will be contacted to make their inputs. It is hoped to be of significant value to social studies teachers who are implementers of the Social studies curriculum. The study may avail social studies teachers with an opportunity to broaden their professional skills in utilization of graphic instructional media in instruction. This would enhance their resourcefulness which will in turn impact behavioural changes in the learners - which is the ultimate goal of education.

To parents and non-governmental organizations, it could engage them to take more prime roles in the provision of instructional media to schools and creating opportunities for capacity building to keep teachers abreast to recent developments in the art of teaching. Finally, the study will provide additional literature that could enrich the existing ones in area of instructional graphics.

1.8 Scope of the Study

The study was limited to investigating the Impact of Graphics on Academic Performance of Junior Secondary School Students in Social Studies in Jigawa State, Nigeria. Junior Secondary School class one and three were not included in the study. It was also restricted to static graphics (hand-drawn / coloured representational pictures). The topic covered in the research was limited to 'drug abuse' drawn from Nigeria Basic Social Studies pupils Book Two.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

In this chapter, an attempt was made to examine literatures that have relevance to this study. These were discussed under the following sub-headings: Conceptual Framework, Theoretical Framework, Relevance of Dual Coding Theory the Study, Psychological Bases of Instructional Graphics, Nature and Scope of Social Studies, Objectives of Social Studies in Junior Secondary Schools, Rationale for Integrating Graphics to Teaching, Static Graphics Use in Teaching and learning, Principles and Elements of Graphics Design, Instructional Applications of Graphics, Impact of Graphics on Learners' Memory, Empirical Studies and Summary.

2.2 Conceptual Framework

The word Graphics is derived from Greek language "*Graphikos"* meaning "something written". The basic idea behind graphics is the intention of writing, which regards all forms of written and drawn elements as writing. It could be described as visual images or designs on some surface, such as a wall, screen, paper, or stone to inform, illustrate, or entertain. In contemporary usage graphics include: pictorial representation of data, as in computer-aided design and manufacture, typesetting, educational and recreational software (Clark, 2010).

Mayer, (2008) defined graphics as, the iconic expressions of content that are designed to optimize learning and performance in ways that improve the bottom-line performance of

organization. This definition incorporates three ideas: Iconic*;* which refers to representations of content that are pictorial. The surface features of such visuals may be static or dynamic and they may have high or low degrees of correspondence to real things. Thus a photograph is a highly realistic representation that is static. The second idea in the definition 'designed to optimize learning and performance;' refers to the purpose of the visual. The focus here is on graphics that are intended to support learning or improve performance in the workplace, such as text pages and online screens as well as work aids such as job cards and Web screens designed to help workers complete job tasks more effectively. Thirdly, 'bottom-line performance;' means visuals that improve learning or performance in ways that pay off in improved organizational results.

Abimbade, (1991) describes graphics as two – dimensional materials in that, they have surfaces that are flat with an area (length and breadth). A well designed graphics may provide the needed structure that allows learners to effectively select, organize, and integrate new information (Mayer, 2011).

Performance is defined as the observable or measurable of a person in a particular situation, usually experimental situation (Simpson and Weiner, 1989). In relation to educational research, academic performance can be regarded as the observable and measurable behavior of a student in a particular situation. The academic performance of a student consists of scores obtained from teacher – made test, first term examination, mid semester test and so on. However standardized tests can provide a more direct representation of the student's knowledge and aptitude than his or her grade in school (Yusuf, 2010).

Ward (1996) defined academic performance as the outcome of education - the extent to which a student, teacher or institution has achieved their educational goals. It generally refers to how well a student is accomplishing his or her tasks and studies (Bell, 2012). In the view of Miller and Birch (2007), the measurement of students previous educational outcomes are the most important indicators of students' future achievement; this means the higher previous attainment, better the students' academic performance in future endearvours.

Ololobou, (1989) conceptualized Social Studies as an organized, integrated study of man, and his environments, both physical and social, emphasizing on cognition, functional skills and desirable attitudes and actions for the purpose of producing an effective citizenry. Okonkwo, (2000) perceives Social Studies simply as the study of man and his physical and social environments and how man interacts with others. Rikichi, (2011) provides an elaborate definition of Social Studies as an educational program which embraces knowledge, values, Skills, Methods, resources, evaluation and societal experiences offered to learners in an effort to promote positive learning and acquisition of useful skills. Okon, (2002) maintained that Social Studies curriculum is keen about developing desirable socio-civic and personal behaviour of an individual in the quest to help the young manage the physical and social forces of the world in which they live.

The study therefore attempts find out whether graphics can enhance the academic performance of students in social studies at Junior Secondary School level.

2.3 Theoretical Framework

In view of the subject matter involved, the research work is predicted on the perspectives of Dual coding theory of memory (Clark and Paivio, 1991). Dual coding theory is an empirically well founded characterization of the mental processes that are involved in human behaviour and experience. It explains the psychological phenomena by collective action of nonverbal and verbal systems that specialized for processing of imagery and linguistic information (Paivio, 1986).

Dual coding theory is a general theory of cognition and mind (Paivio, 2007). It was originated in the 1960s by Allan Paivio to explain the powerful effects that mental imagery has on memory. It is sometimes referred to as a theory of mental imagery, particularly visual imagery. Dual coding theory is a complete set of assumptions/ hypotheses about how information is stored in memory (Sadoski and Paivio, 2001). The theory suggests that memory consists of two separate and distinct mental representations, or codes - one verbal and one nonverbal. The verbal system is "language-like" in that it specializes in linguistic activities associated with words, sentences, and so on. The nonverbal system includes memory for all nonverbal phenomenon, including such things as emotional reactions, images, and other 'picture like' representations.

Dual coding supports the idea that knowledge is represented on a concreteness-abstractness continuum and that human cognition is predisposed to storing mental representations in one of two forms corresponding to the ends of the continuum. At one end are the visually based representations in which knowledge is stored in concrete and non-arbitrary ways. At the other end are the verbal, or semantic, representations in which

knowledge is stored in discrete and arbitrary ways. In this theory, the most fundamental memory units are called logogens in the verbal system and imagens in the visual system (Rieber, 2000)

Both the verbal and visual subsystems have unique properties. Logogens are stored in the verbal system as discrete elements, resembling words and sentences, whereas imagens are stored as continuous units in the visual system having an "all-in-oneness" quality. Dual coding predicts that three distinct levels of processing can occur within and between the verbal and visual systems*:* representational, referential, and associative (Paivio, 1986).

Representational processing describes the connections between incoming stimuli and either the verbal or visual system. Verbal stimuli directly activate verbal memory codes, whereas visual stimuli activate visual memory codes. For example, hearing the word "cat" first activates the verbal system, but seeing a picture of a cat directly activates the visual system. Referential processing is the building of connections between the verbal and visual systems. Hearing or reading the word "cat" will stimulate the appropriate logogen in the verbal system. Subsequently forming a mental image of a cat implies that the verbal system has directly activated the imagen corresponding to cat. Associative processing leads to the activation of informational units within either of the systems (Paivio, 1986). The processes are elaborated diagrammatically in following figure 2.1

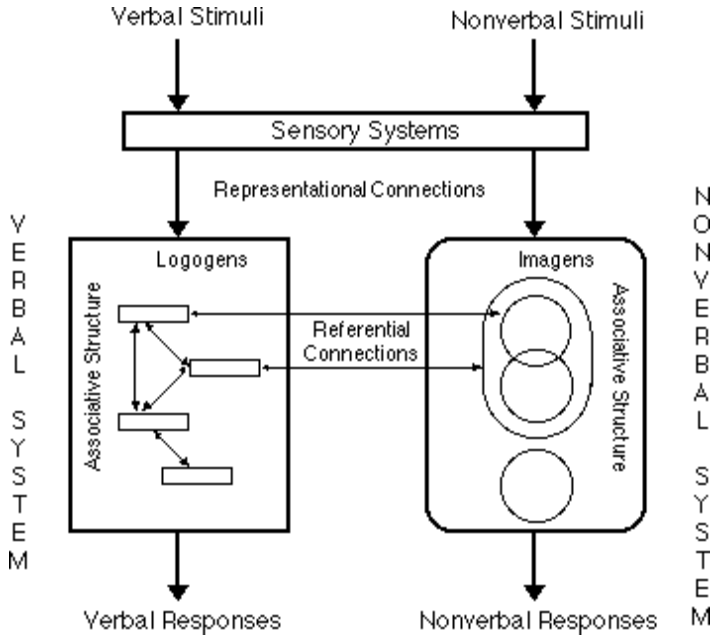


Fig. 2.1: Verbal and nonverbal symbolic systems of Dual Coding Theory.
Clark, J.M. and Paivio, A. (1991).

Paivio, (1971) postulates that the core idea behind dual coding theory of memory is very simple and intuitive: He proposes that the human mind operates with two distinct classes of mental representation (or "codes"), verbal representations and mental images, and that human memory thus comprises two functionally independent (although interacting) systems or stores, verbal memory and image memory. Imagery potentiates recall of verbal material because when a word evokes an associated image (either spontaneously, or through deliberate effort) two separate but linked memory traces are laid down, one in each of the memory stores. Obviously the chances that a memory will be retained and retrieved are much greater if it is stored in two distinct functional locations rather than in just one (Thomas, 2010).

Teachers should be most interested in ways to increase the likelihood that information will be dual encoded in long-term memory. Information encoded in both

verbal and visual forms with strong and flexible links between the codes enhances retention, retrieval, and transfer. According to Klausmeier, (1990) dual coding is more likely to occur when the content lends itself to imaging. For instance, concrete concepts, like "tree" or "house" are easier for people to visualize simply because they refer to tangible objects that have a physical form. Conversely, people do not automatically form internal images for abstract concepts, like "patriotism" or "kindness." In these cases, it is often useful to provide the learner with a prototype image that communicates the most important characteristics or attributes of the concept, such as two people shaking hands to represent "friendship." This prototypical image is mostly analogical to the concept e.g. the portrait of a blindfolded woman holding a set of scales to represent justice.

It can be seen that theoretical foundations of dual coding theory have definite implications on the value and use of graphic instructional media. Marzano, Pickering and Pollock (2001) stated that graphic visuals enhance the development of non-linguistic representations in students, thus enhances the development of the content to be learned. The use of graphic media also helps students generate linguistic representations.

Visuals help student to process and remember learning content by facilitating the development of corresponding imagens. Again being a linguistic tool, text based graphic visuals enhances the development of logogens thereby dual - coding the information. Thus the theory provides a plausible explanation and empirical evidence that concepts are better recalled when presented in both verbal and visual cues.

2.3.1 Relevance of Dual Coding Theory to the Study

The topic under study is Impact of Graphics on Academic Performance of Junior Secondary School Students in Social Studies in Jigawa State, Nigeria. Evaluating learners' academic performance in this sense cannot be detached from the recollection of subject content taught to the students.

Since the researcher was concerned about the instructional content of graphics that are geared towards facilitating the recollection of previously learned materials, the theory was of relevance to topic under study because it provided a constructive framework for understanding the mental processes of human memory, and the subsequent recall of prior experiences. Again, a large component of educational assessments involves tests of intelligence, achievement, and related cognitive processes that measure verbal and nonverbal abilities of learners.

2.4 Psychological Bases of Instructional Graphics

Learning theories have considerable influence on instructional practice in general and instructional graphics in particular (Adewoyin, 1999). Main ideas of the three dominant classes of learning theories – behavioural, cognitive and constructive – were presented briefly. Each makes qualitatively different assumptions about how people learn and remember.

i) Behavioural Learning Theory

The theory of behaviourism as perceived by Mergel, (1998) concentrates on the study of overt behaviours that can be observed and measured. It views the mind as a "black

box" in the sense that response to stimulus can be observed quantitatively, totally ignoring the possibility of thought processes occurring in the mind. He further stated that, some of the key players in the development of the behaviourist theory include; Pavlov, Watson, Thorndike and Skinner. Behaviourism is founded on the formation and strength of stimulus-response (S-R) associations. From an instructional perspective, a stimulus is presented, such as a graphic display that prompts the learner to respond in an overt, observable manner. The relationship between the stimulus and the response is strengthened through the use of reinforcement (Mergel, 1998).

Operationally, stimulus can be defined as either the material to be learned or the instructional event that leads to the learner's initial response. One of the basic goals of behavioural methods is to attain a measure of control or predictability of given instructional stimuli. The repeated use of particular stimuli helps to establish predictable control of learner responses, placing student responses under a form of stimulus control. Using systematic stimulus control, responses can be shaped through the presentation of directions or the repeated presentation of the same stimulus requiring the same response, paired with appropriate reinforcement for the desired response.

The response is the learner's overt behaviour made in response to the instructional stimuli. The learner's response is the only recognized behavioral link to the instructional stimulus. Therefore, it is crucial that a causal link between stimulus and response be established in order to evaluate the effectiveness of the instructional stimulus. It is important that the learner clearly understand what response is required in order for the S-R bond to be formed. The response must be judged as appropriate or inappropriate in clear, objective terms, and this information is then conveyed to the learner as feedback.

Instructionally, responses are elicited through the presentation of instructional activities and shaped through the presentation of systematically controlled activities, responses, and response consequences.

After a response is made and judged, a follow-up stimulus is presented to the student as a consequence to the response. This learner-activated stimulus, or reinforcement, is applied systematically to strengthen desired responses and is chosen conditionally on the desirability of the response. A key element of reinforcement is the principle of contiguity, where reinforcement is given closely in time with the response to be strengthened (Gagné and Glaser, 1987).

During instruction, numerous stimuli are presented. Part of the learner's task, therefore, is to selectively identify relevant stimuli from irrelevant stimuli. Graphics are just one source of visual stimuli competing for the student's attention. From the behavioral point of view, when two or more stimuli are provided, the learner will select the one that most easily results in the correct response. This is known as the "principle of least effort." A typical behavioural task would be to provide a student with a card displaying both the word and picture of an object, such as a cat. If the student's task is to identify the object, the principle of least effort predicts that the learner's attention will focus predominantly on the picture instead of the word in order to achieve a correct response (Rieber, 2000).

He further contented that, the principle of least effort requires instructional designers to be wary of providing any stimuli, such as pictures, that may compete for the learner's attention. If the picture is perceived as providing the information necessary to respond correctly, it will dominate which S-R associations are formed and which are

neglected. From a behavioural point of view, graphics can be potent stimuli resulting in both appropriate and inappropriate learning. Graphics can provide the foundation for strong S-R associations or they can be disruptive or cause interference. Research has shown that learners vary in their susceptibility to interference by graphics; learners with poor reading skills seem particularly vulnerable.

In essence, behaviourist principles of reinforcement, retention, and transfer are important design considerations, as learning is facilitated by reinforcing the correct performances.

ii) Cognitive Learning Theory

The cognitive revolution became evident in American psychology during the 1950's. Cognitive psychologists like Piaget, Bruner, and Ausubel contend that learning is an internal process that cannot be observed directly. Learners first remember and then retrieve information from the memory. Cognitivists emphasize on how human mind works. They put particular emphasis on memory (Mergel, 1998).

According to Mergel, (1998), cognitive theorists recognize that much learning involves associations established through contiguity and repetition. They also acknowledge the importance of reinforcement, although they stress its role in providing feedback about the correctness of responses over its role as a motivator. Cognitive theorists view learning as involving the acquisition or reorganization of the cognitive structures through which humans process and store information.

To cognitive theorist, practice is an important aspect of learning because it gives increased opportunities for reward and reinforcement. Cognitive structures are also created

through practice, which leads to an efficient use of long term memory. Di Vesta, (1987), maintained that in contrast to focusing on strengthening S-R bonds, cognitive orientations to learning consider the actual thought processes occurring in between the stimulus and the response as the most important aspects to learning. The emphasis is on how a learner selects, perceives processes, encodes, and retrieves information from memory.

The implication of this theory to instructional designers is that they could use various techniques of teaching such as chunking, mnemonics etc. for meaningful organization of content and give practice for storing and retrieving information.

iii) Constructive learning theory

Constructivists believe that learners construct their own reality or at least interpret it based upon their perceptions of experiences, so an individual's knowledge is a function of one's prior experiences, mental structures, and beliefs that are used to interpret objects and events. What someone knows is grounded in perception of the physical and social experiences which are comprehended by the mind (Jonasson, 1991).

According to Merril, (1991), the assumptions of constructivism to learning are:

- Knowledge is constructed from experience
- Learning is a personal interpretation of the world
- Learning is an active process in which meaning is developed on the basis of experience
- Conceptual growth comes from the negotiation of meaning, the sharing of multiple perspectives and the changing of our internal representations through collaborative learning

- Learning should be situated in realistic settings; testing should be integrated with the task and not a separate activity.

These theories provide empirical grounds for the application of graphics to teaching and learning process, the conditions in which they enhance learning, as well as the criteria to consider in the design / selection of such instructional resources.

2.5 Nature, Scope and objectives of Social Studies in junior secondary school

Social studies can be conceptualized as an organized, integrated study of man and his environment, both physical and social, emphasizing on cognition, functional skills, desirable attitudes and actions for the purpose of producing an effective citizenry. It is defined as, "A programme of study which a society use to transmit to students the knowledge, skills, attitudes and actions it consider important concerning the relationship human beings have with each other and with their world" (Rikichi, 2011, p.31)

The scope of social studies is quite extensive, it covers areas of knowledge, skills, attitudes and values, with the ultimate aim of producing people are socio-civically competent. Its contents are drawn from disciplines such as anthropology, archeology, economics, history, geography, law, political science, religion, mathematics, and natural sciences (Rikichi, 2011). The primary purpose of social studies education is to help young people to develop ability to make informed and reasoned decisions for public good as citizens of a culturally diverse democratic society in an inter-dependent world.

The Nigerian Educational Research and Development Council, (NERDC) in 2006 designed and developed the current realigned 9-year Basic Education Social Studies

Curriculum to take cognizance of certain challenges facing this area of study as a core subject. The new curriculum incorporated many of the contemporary issues of global and local concern such as, youth unemployment and youth restiveness, environmental issues, drug abuse, child/women trafficking, family life education, HIV/AIDS preventive measures, gender issues, peace and conflict issues, Nigerian peoples and their cultures, mass media, globalization, millennium development goals (MDGs), and so on. The new curriculum, according to NERDC (2007) has its pivot, functional education, self-reliance, and responsible citizenship.

Thus Social studies is a dynamic course of study that is ever changing with regard to the variables of space, time, and human development. One of the characteristics of a functional social studies program is its ability to cope with and accommodate new developments and challenges. According to Rikichi, (2011), social studies is not so much concerned with theory building, rather it interrelates the already formulated theories in order to gain an understanding and wider perspective in the study of man and how he solves his/her societal/environmental problems.

The National Policy on Education (FRN 2004) listed Social Studies among the core subjects that every pupil at Junior Secondary School is expected to study to prepare him/her to acquire further knowledge and skills (p.14). To this end, NERDC, (2007) States that the overall objectives of social studies at both Basic Education and Junior Secondary level should enable the pupils and students to achieve the following:

a. Develop the ability to adapt to his/her changing environment;

b. Become responsible and disciplined individuals capable and willing to contribute the development of their societies;
c. Inculcate the right types of values;
d. Develop a sense of comprehension towards other people, their diverse cultures, history, and those fundamental things that makes them human;
e. Develop the capacity to recognize the many dimensions of being human in different cultural and social contexts;
f. Develop a sense of solidarity and sharing based on a sense of security in one's own identity.

The Social studies curriculum is basically geared towards inculcating in Nigerian youth ideas, norms, and values that are essential for national development. Rikichi, (2011) maintain that this would produce effective citizens who are Sensitive to their environment; active participants in the polity; democratic-orientated minded; willingness to assume and perform civic responsibilities; obedient to the law of the land; dogged in defense of his rights; positive relation with political class; harmoniously co-exist with other members of the society; and possess nationalistic and patriotic spirit towards societal improvement.

In order to present social studies in a holistic manner to students, the learning contents were organised in themes / sub - themes. Major relevant themes were selected and topics were arranged under them across the 9-year basic education in a spiral manner to sustain the interest of the students. For effective delivery of subject matter and improved learning achievement of basic education, NERDC strongly recommends teacher orientation

and training on the implementation of the curriculum, as well as development of relevant resource materials.

2.6 Rationale for Integrating Graphics to Teaching and Learning

Teachers are responsible for inculcating of knowledge, skills, and values to hundreds of students and ensure that learning take place (Roberson, 2012). Over the years, graphic visuals have become a popular teaching strategy in Nigeria secondary schools. The relevance of graphics to teaching-learning process can be seen in the following aspects:

i) Motivating Learners

An optimal amount of arousal (not too little and not too much) is essential to activate the learners' interest and induce them for acceptable levels of performance. Graphics has the potential to increase the intrinsic motivation of a learning environment by arousing students' curiosity, optimizing the challenge of an activity, and encouraging students to use their imaginations (Rieber, 2000). This makes the students to concentrate fully on the learning task at hand.

ii) Differentiating Instructional Strategy

As educators learn more about how to reach all types of learners, graphic instructional media are used to assist teachers in differentiating instructional methods e.g. from verbal to visual instruction and practical activities. Today's students need constant stimulation therefore oral instruction / lecturing alone is not an effective teaching strategy by itself (especially at lower levels of education). The use of graphic aids allows teachers

to vary the delivery of lessons and keep students interested in learning (Roberson, 2012). This caters for the different learning styles and abilities among the students.

iii) Provides Access to instructional Content

Graphics are more concise than words and enable us to communicate ideas which are difficult, if not impossible to describe in words. They provide opportunities for much needed access to content especially when learners are low-level readers. Using pictures, concept maps etc. are ways to teach these students the lessons' objectives while also keeping them interested in the material. Without graphic aids, these students will find it difficult to comprehend the lesson and keep up with instruction.

iv) Facilitates Greater Comprehension

Graphics make instruction meaningful for students and help the teacher attain lesson objectives by providing emphasis in a different way than speaking. Clear pictures, graphs, or models multiply the students' level of understanding of the material presented, and they can be used to reinforce a message, clarify points, and create interest. As observed by Clark and Lyons, (2004) visuals help learners see the relationships among information in a lesson and in turn help learners build mental models that are a basis for higher-level thinking and problem-solving (Illian, 2012). They allow students to spend more time with the content and solidify understanding. When students work together on graphic aids, there's a scaffolding of information and an exchange of ideas. This experience helps students to the master materials, increasing their confidence and ability.

v) Engages Learners

Visual aids engage more students in the lesson because it requires a change from one activity to another: from hearing to seeing and sometimes touching. This enables the teacher to appeal to more than one sense at the same time, thereby increasing student's understanding and retention level. With drawings, posters, transparencies and other visuals, the concepts or ideas presented are no longer simply words - but words plus images. Therefore graphics are great tools to use for engaging all students in the learning process. It helps to cater for the individual differences among students in terms of learning styles, intelligence, and maturity, this way all learners are carried along during the instructional process.

vi) Illustration for Abstract Concepts /Information

Graphics prove valuable in teaching abstract information by providing spatial metaphors for logical structure (Rieber, 2000). Using space, lines, boxes, arrows, color, and the relative distance between elements, for instance, an illustration can provide a concrete equivalent of abstract ideas. Many writers have outlined methods of making graphic representations of the common structures of information, such as comparison and contrast, procedural steps, description, causation, and chronology. For example, column charts are efficient for comparing or contrasting the characteristics of items; time lines are good at showing chronological relationships; flow charts can show causation clearly.

vii) Attention Capturing

Gaining the attention of students is a precondition to any kind of learning. It appears first in most lists of events in the instructional process. In the terms of cognitive

psychology, gaining attention is critical because of the limited capacity and duration of the "short-term" or "working" memory. Graphics help in focusing attention and motivating learners. These are key factors in any successful learning activity. The efficiency of the receptive mechanism of sight is fully exploited for optimum learning. Research has shown that attention is naturally drawn to the novel or unique (Fleming, 1987). Obviously, the use of graphics can be an important strategy for influencing attention, if they are used deliberately in novel or unique ways.

viii) Enhancing Content Retention

Studies suggest that when information is presented verbally and visually it has a better chance of being remembered. Corroborating research shows that concrete words are remembered better than abstract words, and that pictures alone are remembered better than words alone (Fleming and Levie, 1978). Learners are more likely to retain and recall contents that are presented visually with a greater percentage than what they hear only. The visual dimensions added to the learning material concretise learners' experiences. This is Vital because memory is frail and fickle, unless it rests on understanding. This assertion corroborates with the Chinese dictum:

What I hear, I Forget,

What I see, I remember,

What I do, I understand (Adewoyin, 1991).

The Educational Significance of graphic aids as enumerated by Mudasir and Aqueel, (2012) is to: help in Showing relationship by means of facts, figures and statistics; understanding of abstract concepts and ideas in visual form; securing the attention of the pupils by their attractive format and simplicity of layout; Gaining of concepts of size,

distance, space, location and direction by means of maps; developing the power of analysis, synthesis and deriving conclusions from a data; and the grasping of information easily.

Baker and Bixler (1990), states that the purpose of most instructional graphics is to help explain something to the viewer in a manner that hopefully increases retention of the subject matter. To him Instructional graphics have seven possible functions in instruction:

- Descriptive - To show what an object looks like.
- Expressive - To make an impact on the learner.
- Constructional - To show how the parts fit together into the whole.
- Functional - To show a process or the organization of a system in a simplified manner.
- Logico-mathematical - To display a mathematical concept such as a curve graph. Some line graphs and charts with a scaled X and Y axis fall into this category.
- Algorithmic - To show a holistic picture of the range of possibilities. Flow charts fall into this category.
- Data display - Illustrating textual data visually. Bar charts, pie charts, and histograms fall into this category.

2.6.1 Static Graphics Use in Teaching and Learning

Mudasir and Aqueel, (2012), outlined the main static graphic aids used in teaching and learning as follows:

Diagrams: A diagram is a drawing that shows arrangements and relations of parts to the whole. It is a visual symbol made up of lines, curves and geometrical forms. These are used for teaching science, geometry, geography, and so on.

Graphs: A graph is a diagrammatic representation of numeric or quantitative data. They are considered as pictures which are self – explanatory and tell their story at a glance. They are used for analysis, interpretation and for comparison. The different types of graphs include line graph, bar graph, circle or pie graph, pictorial graph and flannel graph.

Maps: A map is an accurate representation of plain surface in the form of a diagram drawn to scale, the details of boundaries of continents, countries etc. Geographical details like location of mountains, rivers, altitude of a place, contours of the earth surface and important locations can also be represented accurately with reference to a convenient scale with suitable colour scheme. Maps are of different types such as topographical maps, wall maps, atlas maps, relief maps, geographical maps, mineral maps, agricultural maps etc. As teaching aids, they are indispensable in teaching fundamental concepts such as size, distance, space, location and direction.

Posters: A poster is a bold and symbolic representation of a single idea. It is used in all walks of life, to convey, forcibly the desired information to a layman.

Cartoons: A cartoon is a metaphorical presentation in the form of picture or a sketch. It is universal in appeal and conveys only one idea.

Flash Cards: Flash cards are pieces of card board or hand paper on which a word or words are written or some picture is drawn. These can be used for word recognition, team competitions, teaching in speaking, and teaching writing.

Charts: A chart is a combination of pictorial, graphic, or numerical materials which presents a clear visual summary. The most commonly used types of charts include outline charts, tabular chart, and organization charts.

2.6.2 Principles and Elements of Graphics Design

Graphic design is the process of communicating visually using text and images to present information. The elements and principles of design are the building blocks used to create a work of art. The elements of graphic design can be thought of as the things that are involved to make up a good painting, drawing, and so on. Azi, (2011) enumerated seven elements of design:

Line – Line can be considered in two ways. The linear marks made with a pen or brush or the edge created when two shape meet. The eye travels around the space created by the line. It defines the position and direction of design. The design should identify some sort of line so that human eye can recognize which side is the top of the design or on which side the design is supposed to start with interest.

Shape – Shape is something distinguished from its surroundings by its outline within a design. It is a self-contained area of geometric or organic form. Shapes are powerful communicators as well, even when they are not used directly in a contrasting manner. For example, Circles have always been associated with the endless rhythmic patterns of time, symbolizing eternity without clear beginnings or endings, triangle convey direction, and so on.

Direction – All lines have direction; horizontal, vertical, or oblique. Horizontal lines suggest calmness, stability and tranquility. Vertical gives a feeling of balance, formality and alertness. Oblique suggest movement and action.

Size – Size is simply the relationship of the area occupied by one shape to that of another. Proportion can be achieved by incorporating elements of varying sizes or shapes in a layout.

Texture – Texture is the surface quality of a shape – rough, smooth, soft, hard, glossy, etc. Texture can be physical (tactile) or visual. It helps a design to distinctive characteristics.

Colour – Colour is the most visible component of light that falls on a retina of the eye. Colour is of value when it emphasizes relevant cues, is used as a coding device, or when it is part of the content to be learned (Clark and Lyons, 2004). Warm colors (red, orange) come forward and command our attention, while cool colors (blue, green) recede. Also the colours on one side of the design should matches with the other.

Tone– This is the relative lightness or darkness of a colour. The colours on a design should be light or dark enough for the proper mood.

Principles of graphic designs are simply the laws of designing graphic visuals (jiskha.Com, 2012). They can be thought of as what the designers do to elements of design. The manner principles of design are applied determines the success of creating a work of art. According to Palilonis, (2006) the principles of "good" graphic design are as follows:

Balance – This refers to designing of graphics for a comfortable sense of equilibrium. Asymmetry creates a sense of movement and helps to guide the eye; symmetry conveys stability and uniformity and is thus more conservative. For instance, a large shape close to the center can be balance by a small shape close to edge. Visuals that lack balance disrupt the perception process of learners.

Harmony – This means how well individual parts of a page work together, and are consistent, like typefaces, shapes, and lines. Harmony is the visually satisfying effects of combining similar, related elements. E.g. adjacent colours on the colour wheel, similar shapes etc.

Repetition (rhythm) – This concerns the arrangement of elements in the visual that moves the viewers' eyes across a graphic. Repetition with variation is interesting, without variation is monotonous.

Contrast– This helps to define what is important, and can be used with text, color, and shapes. It is the juxtaposition of opposing elements e.g. opposite colours on the colour wheel, contrast in value or tone – light/dark, contrast in direction – horizontal/vertical etc. Contrasting elements guide the eyes around the page, create a hierarchy of information, and enable viewer to skim through the vast array of information pick out what was needed (Illian, 2012). The major contrast in a graphic should be located at the center of interest. Too much contrast scattered throughout a graphic can destroy unity and make a work difficult to look at.

Textures - The spatial arrangements of elements in a graphic to attract attention, in such a way that it enhances recognition.

Proximity – This refers to the placement of objects being either close together, if they "belong" together or far apart if they don't.

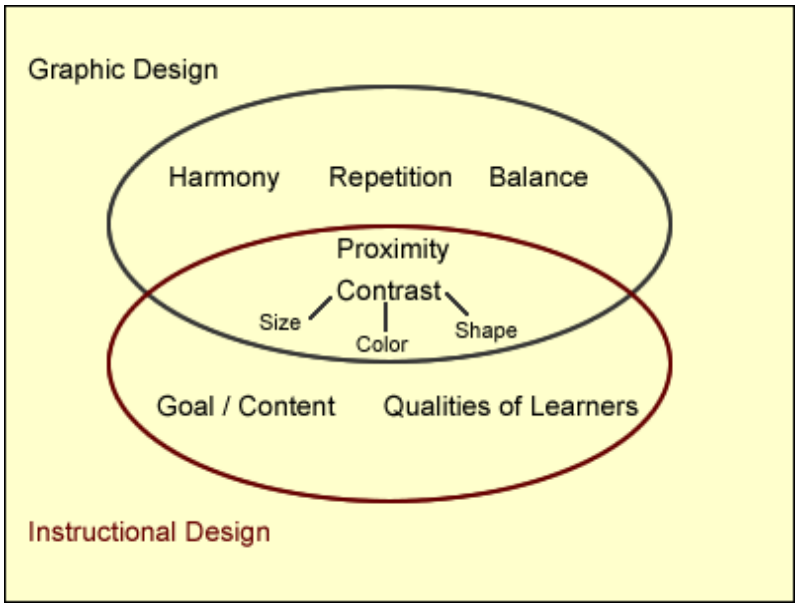


Figure 2.2: principles of graphics design. Illian, k. (2012).

Lester, (2000) maintained that, the instructional graphic designer should strive to gain and hold the viewer's attention, for without these occurring the message is lost before it has ever been conveyed. Attention is always subjective –individuals tend to give attention to what interests and arouse their feelings and/ or needs. The clear and complete organization of an instructional graphic can help grab learners' attention, and help them to "chunk" the information into working memory.

2.6.3 Instructional Applications of Graphics

Rieber, (2000) put forward five instructional applications of graphics as guides to the ways graphics can be used in instruction. These are: cosmetic, motivation, attention-gaining, presentation, and practice. The five applications took into cognizance learning outcomes and the events of instruction. He opined that the rationale for needing these guideposts is to guard against faulty decisions to include graphics based on misinformation, misinterpreted information, or no information. These functional categories

should help the teacher to design and evaluate instructional graphics based on whether the intent of a graphic is to contribute to learning or to the affective appeal of a lesson.

i) Cosmetic Graphics- Graphics is often used for purely cosmetic reasons. In a sense, it is a misnomer to call this an instructional function, because, by definition, no direct learning benefits are expected from cosmetic graphics. The purpose of a cosmetic graphic is to merely add to the polish or decoration of a package to make a program more attractive or aesthetically pleasing (Rieber, 2000). Cosmetic graphics involves fancy screen borders, some uses of color, and the use of special effects. Cosmetic graphics often add a certain level of completeness or sophistication to a package. This may promote the feeling among students that the instruction is important, whether or not this is true.

ii) Motivational Graphics- Graphics is often incorporated into instruction to raise the general enthusiasm level of a lesson. Much of the motivating appeal of graphics is due to novelty. Unfortunately, novelty effects are temporary, gradually disappearing over time (Clark, 2000). Using graphics to arouse general curiosity and interest is seen by many as a very superficial way to increase motivation. There are deeper ways to maintain attention and interest beyond the simple provision of interesting graphics. For example, if the nature of the learning task is satisfying, relevant, and challenging, students are more likely to participate in meaningful ways. Hence, their time on-task is not only increased, but the quality of this learning time is enhanced as well.

iii) Attention-Gaining Graphics - Graphics are often used for attention-capturing. This is an element of learning, because there are many sources of stimuli that compete for a learner's attention in and out of the classroom. Many of these sources are probably far

more interesting than the instruction itself. Usually, these competing stimuli come from the student's environment, such as screeching chairs, music or laughter from down the hallway, or an attractive member of the opposite sex sitting in the next row. Competing stimuli also can come from within the student's own mind, such as personal concerns like a home crisis or just general daydreaming.

Attention-gaining is an important initial event of instruction (Gagné, 1985). It is an obvious, practical, and rational application of graphics teaching and learning. It is an effective way of arousing and maintaining learners' attention during the instructional process. Hopefully, this attention will be maintained long enough to capture the student's interest in the learning material displayed on the poster.

iv) Presentational Graphics- Graphics can be used with or without accompanying text to demonstrate or elaborate a lesson concepts, rules, or procedures. The use of static and animated graphics as a presentation device has been called "learning-by-viewing approach" to instruction (Lester, 2000) .Most instructional applications of this type use representational graphics to directly depict critical information students.

Mayer, (1989) States that presentational graphic is an effective strategy for communication; because it helps learners focus their attention on the explanative information in the text. They also help learners form visual mental models of the materials explained by the text. Mayer suggest that visuals are useful presentation strategies when they satisfy four conditions: 1) the text is potentially understandable by students; 2) the visuals are designed and evaluated in terms of learner understanding; 3) the visuals are

used to explain information provided by text; and 4) students have little or no previous experience with the content.

v) Practice Activities - Graphics can be very useful in practice activities. It can act as visual feedback to students as they interact with lesson ideas and concepts. This application of graphics is particularly suitable to computer medium, such as those involving visually based simulations (Rieber, 2000). Students learn from visual by discovery and practical work, in this way graphics act as instantaneous feedback. This application of graphics entails 'learning by doing'.

In the same vein Bonnie, (1999). Summarized the applications of graphics to teaching and learning as follows:

- Attention – pictures or graphics attract attention to the material or direct attention within the material. This will heighten the likelihood of the learner to remember the material.
- Affective -- pictures enhance enjoyment or affect emotions and attitude. This makes learning lively.
- Cognitive – This involves using pictures too increase comprehension (for example, providing elaboration for a text explanation), to improve retention, recollection and retention of instructional contents, or to provide information that is otherwise not possible.
- Compensatory – The compensatory use of graphics involves using pictures in helping poor readers by adding pictorial clues to decode text (by illustrating main points of the text).

2.7 Impact of Graphics on Learners' Memory

For generations, graphics have been incorporated within educational materials to enhance learning (Rieber, 1994). As computer technology has advanced, the potential variety and overall quality of the graphics has increased. Such graphic include pictures, cartoons, charts, maps, diagrams, outlines, videos, and so on. Color, clarity, and animation are examples of enhanced features that are now readily used.

Alesandrini, (2002) explains that from an instructional viewpoint, graphics can facilitate learning in the following instances: a) when used to represent actual people, places, or things; b) when the graphic helps to simplify difficult, complex, and/or abstract material (e.g., a government organizational chart) ; or c) when used as an analogical bridge between familiar, already learned materials and unfamiliar, or to be learned materials (e.g., a graphic of a familiar truck to facilitate learning the functions of an unfamiliar red blood cell).

As identified by Tversky, et al., (2002) there are several key reasons why graphics can be utilised to enhance learning. First, they can make the learning more efficient. Pictures and other visuals help reduce the need for long textual descriptions. In such cases, a picture really can be "worth a thousand words." Thus the use of graphics may lead to more efficient processing of information by utilising the visual channel while reducing the information needed to be processed via the verbal channel. Second, well-constructed graphics can organise complex materials so that key features are more readily ascertained and understood, as well as show spatial relations between important elements that otherwise may not be discovered by a learner. Based on Mayer, (2001, 2003), active

processing assumption, well-designed graphics may provide the needed structure that allows learners to effectively select, organise, and integrate new information.

Occupational Safety and Health Administration (Osha, 2012) asserts that, the impact of graphic visuals on increasing the learners' understanding and retention level is glaring. This claim could be substantiated from the chart 2.3 below:

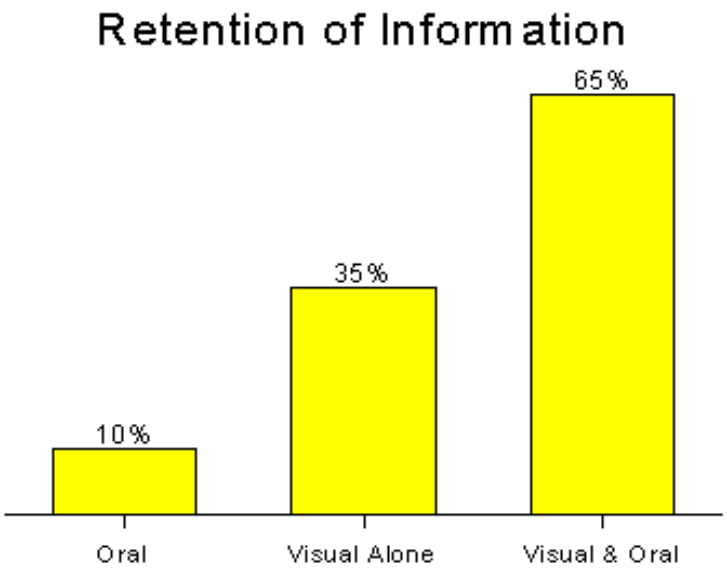


Fig. 2.3: Percentages of Information retention (Osha, 2012)

Osha (2012), maintained that empirical studies on human learning and memory reveal interesting statistics that support these findings:

- Experimental psychologists and educators have found that retention of information three days after a meeting or other event is six times greater when information is presented by visual and oral means than when the information is presented by the spoken word alone.

- Studies by educational researchers suggest that approximately 83% of human learning occurs visually, and the remaining 17% through the other senses - 11% through hearing, 3.5% through smell, 1% through taste, and 1.5% through touch.
- The studies suggest that three days after an event, people retain 10% of what they heard from an oral presentation, 35% from a visual presentation, and 65% from a visual and oral presentation (Osha, 2012).

A general benefit of graphics is that they are visually appealing. Viewers' attention is attracted to these displays, and viewers are more likely to study them for longer periods of time. This, in turn, can lead to enhancement of memory for information depicted in them. For example, one study of memory for materials taught in introductory psychology courses found that students recalled ideas and examples presented in pictures and in-class demonstrations better than information presented in the text alone (Vanderstoep, 2000).

Mayer, (2001), maintained that in addition to directly enhancing memory for information, graphics can also make complex information easier to comprehend. Thus require less cognitive effort to understand than text-based descriptions of the same information. Better comprehension, along with more cognitive resources that can be allocated to learning and memory, will together enhance memory for the information to be learned. Mirchas and Berry, (2001) further explain that visual displays are particularly beneficial to the comprehension of concepts. They further asserted that graphics enhance learning in four dimensions:

First, it communicates cause – and - effect information. For instance, a diagram can help illustrate how turning a key can unlock a door. When such displays are designed to

highlight the cause- and-effect sequence (e.g., by animating one portion at a time or by using a sequence of arrows), viewers' comprehension and memory for the cause- and-effect information is enhanced.

Second, visual displays are frequently useful for representing relationships amongst elements (e.g. a Venn diagram, a text-based graphic organizer, a scientific model). One benefit of such representations is that they can facilitate problem solving. Another benefit is that they provide concrete representation of key concepts or elements and their relationships. Again, graphic organizers are often used to represent relationships among the main ideas in a text. For example, information in a text can be summarized in matrix form such that similar concepts are closer together along one or more dimensions. Research has suggested that representations that group relevant concepts, such as matrices, can significantly enhance memory for text compared to representations that simply summarize materials, such as outlines (Rieber, 2000).

Third, visual displays are useful for communicating information that is intrinsically spatial. For instance, visual displays of a map of a building or a drawing of how different parts of a car engine fit together communicate information that is difficult to describe verbally. One general guideline is to design displays that facilitate integrating relevant information (placing text and graphics together) to reduce working memory load and allow viewers to focus on learning relevant content.

Fourth, visual displays provide natural mappings to quantitative information (using graph to show annual economic growth) and thus increase comprehension and memory for quantitative information. One difficulty associated with graphs is that students often make

interpretation errors and therefore remember erroneous data. Shah and Hoeffner, (2002) opined that it is pertinent for instructors to acquaint themselves with the guidelines for designing graphs to depict data to students for instructional purposes.

The functions of graphics in learning are not limited to presenting visual information to students, but also asking them to create them. Creating visual artifacts or inscriptions appears to be motivating to students, especially when they share their products with fellow students. Furthermore, developing the visuals forces students to consider the important elements and relationships in a topic and also to identify what information they understand and what they do not (Roberson, 2012). Thus, the creation of graphics can be used to enhance comprehension and memory for to-be-learned information.

In a nutshell, graphics develop motivation, understanding, retention of concepts, as well as discovery potentials among learners. It reduces the cognitive load on learning new material because learners' attentions are directed to the significant elements in a topic and away from items of less importance. Based on these theoretical justifications, graphics can impact upon overall learning.

2.8 Empirical Studies

The use of graphics as an instructional resource has been a popular research issue. Various studies dealing with the effects of pictures and other graphics on learning were conducted by chain of educationists to throw more light on the phenomenon.

A study by Hawk (1986) involved above average students in sixth and seventh grade life science classes, and examined the effectiveness of graphics as an advance

organizer on students' achievement. A total of 455 students from 15 classes were in one of two groups: one group received graphic organizers at the beginning of a chapter; the other group did not receive graphic organizers. Each participating student in the study scored above the 60th percentile on a standardized achievement test. The treatment variable was the use of graphic organizers throughout the first seven chapters of instruction in the life science class. The control students did not have graphic organizers during the instruction of the first seven chapters. The same Life Science text was used in all 15 classes. Identical pretests and posttests containing 50 items were used for evaluation purposes. Students in classes that used graphic organizers scored significantly higher on posttests than students in the control group.

One of the most prolific instructional visual researches to date has been the study conducted by Dwyer (1987). He conducted the research with more than 8,000 high school students and 40,000 college students. The study investigated the effects of representational pictures varying from highly detailed color photos to simple line drawings as an aid to learning the content contained in the script. Also studied were the effects of various lesson strategies on visualized instructions, such as using moving arrows and inserted questions as cueing strategies. The most unique aspect to Dwyer's research is its systematic approach to investigating the use of visuals in instruction. The instructional materials of every study involved a 2,000-word script describing the parts, locations, and functions of the human heart. True to instructional design principles, instructional visuals were only added to illustrate parts of the script found difficult to learn. A total of 37 such critical areas were augmented with visuals (Rieber, 2000). The types of visuals used in any one study depended on the research question being asked. A variety of treatment combinations were

studied, such as incorporating the programmed materials into print-based materials, slide/tape materials with audio and computer-based materials. This research effort, known as the Program of Systematic Evaluation (PSE), has produced more than 150 published research studies.

Dwyer's research findings showed that visuals are not equally effective across learning situations. Effectiveness of all instructional strategies, such as visuals, depends on a wide array of factors, such as learners' characteristics, instructional task etc. The most consistent results found by Dwyer were related to the amount of realism in the visuals. The results suggest that pictures facilitate learning for adults under certain conditions. Learners need sufficient time to scan and interpret visuals with highly realistic details – richly detailed visuals require the learner to attend to and systematically scan the visual in search of essential learning cues. They opined that, if insufficient time is given, students may actually choose to ignore the visuals and attend to the more familiar, printed text.

Guastello, (2000) assessed the effects of concept mapping on a science unit with low-achieving seventh graders in urban Brooklyn, New York. Each participating student had demonstrated below average achievement in both science and reading on standardized assessments. Students were randomly assigned to either a concept mapping group or a read and discuss group. The concept mapping group constructed organizational maps of the unit material with the assistance of the teacher as the students read the chapter in the book. The read and discuss group read the chapter in sections and participated in discussion and questioning following each reading. The study was conducted over a period of eight school days during the students' regularly scheduled science classes.

The results of the study indicate the two groups scored similarly on pretests of the unit material and on science and reading achievement. Because the pretest was significantly correlated to posttest scores, an analysis of covariance (ANCOVA) with pretest scores as the covariate was conducted. The results showed a statistical significant main effect favouring the graphic organizer group indicating that instructional techniques using graphic representations are more effective than traditional methods. The authors suggested that concept mapping, if used to teach textual material, might assist students to build schemas for understanding a lesson's concepts. Furthermore, the process of creating the semantic map may simply serve to focus students' attention on the relevant sections of the text.

Most recently, Lai and Newby, (2008), carried out a research on the impact of static graphics and animated graphics on a complex learning task. The study compared the impact of different categories of graphics used within a complex learning task. One hundred eighty five native English speaking undergraduates participated in a task that required learning 18 Chinese radicals and their English equivalent translations. A post-test only control group design compared performance differences following training between five groups of participants (control, concrete verbal imagery information, single static graphics, multiple gradient static graphics, and animated graphics) on both immediate and 4-week retention tests.

Data analysis indicated all graphic groups significantly outperformed the control group immediately following training. A 4-week delayed test showed those originally receiving multiple gradient static graphics significantly outperformed all other groups except those receiving the animated graphics. Lai and Newby attributed this to the

cognitive theory of multimedia learning (Mayer, 2005), which postulates that working memory within the human information processing system consists of both the auditory/verbal as well as the visual/pictorial channels for processing information.

2.9 Summary

The theoretical framework of the study was discussed based on the perspectives of dual coding theory as postulated by Paivio, (1990) to serve as an empirical groundwork for the research. The classifications and the psychological basis of graphics in teaching – learning as well as their impact on enhancing learners' recall of lesson content were elaborated. Most of the literatures reviewed revealed that the application of graphics to instruction could bring about increased retention of learning content and induce active participation of learners in a lesson. It was thus established the potentials of employing graphics as a valuable teaching and learning resource for boosting of students' academic performance in Nigerian Junior Secondary schools.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology that was employed in conducting the study. It was structured under the following sub-headings: Research Design, Population, Sample and Sampling Technique, Instrumentation, Validity of the Instrument, Pilot Study, Reliability of the Instrument, Procedure for Data Collection, Procedure of Treatment and Procedure for Data Analysis.

3.2 Research Design

The design adopted for the study was quasi experimental research design involving pretest – posttest control design (non - randomized, non – equivalent). This type of experimental research is concerned with finding cause-effect relationships between two or more variables. The pretest-posttest-control design was applied to source information on the Impact of Graphics on Academic Performance of Junior Secondary School Students in Social Studies in Jigawa State of Nigeria. Sambo, (2008) describes the pretest – posttest control group design as an experimental design that controls the threats to internal validity of an experiment. It eliminates bias by random assignments of study subjects to group, controls the effects of history as the activities of the experimental and control group are conducted simultaneously. It also gives data which is easily interpretable and can be analyzed to answer research hypothesis and/or research questions.

3.3 Population

The target population of the study was JSS 2 students of public junior secondary schools of Garki L.G.A., Jigawa State amounting to 948, spread across the 14 junior secondary schools in the Local Government Area. The choice of this population was purposive, because they constituted a better source for obtaining the accurate data needed for the research. Dyel, (2011), reported that JSS II students were considered suitable for this type of study by virtue of their academic experience since they had spent 1 year already. JSS I could not be used because they were only being newly introduced to the subject, while JSS III were busy with their Junior Secondary School Certificate Examination (JSSCE). The description of the study population is presented in figure 3.1 below:

Table 3.1 Study Population: JSS 2 Students in Public Junior Secondary Schools in Garki L.G.A., Jigawa State for 2012/2013 Academic Session

No.	Name of School	Location	No. of JSS 2 Students		Total
			Male	Female	
1.	Government Junior Sec. Sch. Ajura	Ajura	19	07	26
2.	Government Junior Sec. Sch. Doko	Doko Gabas	41	15	56
3.	Government Junior Sec. Sch. Fagen-Gawo	Fagen-Gawo	11	13	24
4.	Government Girls Sec. Sch. Garki	Kwanar Garki	-	145	145
5.	Gov. Junior Arabic Sec. Sch. Garki	Kofar Kudu	46	127	173
6.	Government Junior Sec. Sch. Garki	Kofar Arewa	142	52	194
7.	Government Junior Sec. Sch. Gidan-Maza	Gidan-Maza	50	-	50
8.	Government Junior Sec. Sch. Gwarzon- Garki	Gwarzon- Garki	20	05	25
9.	Government Junior Sec. Sch. Kanya	Kanya Mai-kaho	14	06	20
10.	Government Junior Sec. Sch. Kargo	Kargo	53	47	100
11.	Government Junior Sec. Sch. Kita	Kita	34	07	41
12.	Government Junior Sec. Sch. Kore	Kore	49	17	66
13.	Government Junior Sec. Sch. Muku	Muku	06	04	10
14.	Government Junior Sec. Sch. Sugungun	Sugungun	14	04	18
	Grand Total:		**499**	**449**	**948**

Source: Planning, Research and Statistics Section, Garki LGEA, State Universal Education Board, Jigawa State.

3.4 Sample and Sampling Technique

A sample of 214 was purposively selected for the study from the parent population of 948 students. The sample comprised of one intact class from each of the four selected Junior Secondary Schools. Two hundred and fourteen subjects were considered viable for the study based on the view of Dyel, (2011) who recommends a minimum of 30 study subjects for an experimental study.

Stratified simple random sampling technique of balloting was followed to select the four intact classes used in the study. The names of the classes were placed in a cup, and one class was picked at a random until the four classes were selected (Bello and Ajayi, 2010). As observed by Dyel, (2011), Stratified simple random sampling techniques ensure that differences in subjects, such as level of intelligence, social background and sex, etc., are evenly distributed in a sample to be selected.

The students from Junior Secondary School Garki, (50 subjects), and Junior Secondary School Kore, (66 subjects) formed the experimental group; while students from Junior Secondary School Kargo, (57 subjects) and Junior Secondary School Kita, (41 subjects) were used as the control group based on random selection using even and odd numbers. The experimental and control groups were located in schools that were far apart, in order to eliminate the effects of students interaction. The detail of the study sample is presented in Table 3.2 below:

Table 3.2: Sample Selected for the Study

S/No	Selected Schools	Grouping	Samples selected based on sex		Total
			Male	Female	
1.	JSS Garki	Experimental Group	35	15	50
2.	JSS Kargo	Control Group	40	17	57
3.	JSS Kore	Experimental Group	49	17	66
4.	JSS Kita	Control Group	34	07	41
		Total	**158**	**56**	**214**

3.5 Instrumentation

The research instruments adopted for this study were Social Studies Academic Performance Test (SAPT) and Graphics Media Learning Package (GMLP). This is because Academic performance test is usually designed to indicate the degree of success in some past learning activity (Yusuf, 2009). Graphics Media Learning Package was also used as the treatment for the experimental group. Twenty questions were developed in the Social Studies Academic Performance Test for JSS II Students (adapted from Dyel, 2011) to assess students' performance on the topic selected for the study – drug abuse (see appendix A). A Marking scheme for the 20 test items was accordingly constructed for the test items as shown in appendix C. The test was administered to study subjects in both the control and experimental group before and after the experimental treatment respectively to evaluate the students' performance.

The researcher developed a Graphic Media Learning Package (GMLP) which depicts visual presentations of drugs and activities relating to "Drug Abuse". Carefully

planned activities that would elicit and exploit visual potentials of the experimental group members were developed such as: In identifying drugs and other chemical substances that are commonly abused in our society; distinguishing the modes of drug abuse; identifying the destructive effects of drug abuse; and appraising the roles of parents, teachers, community leaders and law enforcement agencies in curbing the menace of drug abuse in the society.

In developing the graphic visuals, the Nigerian Basic Social Studies for JSS Pupils Book II and the teachers' guides of the same book (Anikpo, *et. al*, 2008) and a pamphlet on psychotropic substance abuse for patent medicine dealers in Jigawa state (NDLEA, 2010) were consulted as reference materials.

3.5.1 Validity of the Instrument

The content of the Social Studies Academic performance Test and the Graphic Media Learning Package were validated by educationists in the fields of Instructional Technology, Evaluation and Measurement, and Social Studies to ascertain its validity. The items were then taken to the research supervisors who made some recommendations for adjustments, before final drafts were made. The decision by the researcher to employ the services of experts was based on the remark of Rikichi (2011) who stated that validation by specialists is an effective method of content validation of a research instrument. The specialists assessed the suitability of the instruments that is; ascertain whether or not the test items and the pictures in the graphics learning package were congruent to the objectives of the study. After thorough evaluation, it was suggested that the instruments were appropriate, and relevant to the study.

3.5.2 Pilot Study

Pilot study was conducted to ascertain the feasibility and reliability co-efficient of the test instrument through a trial test. Junior Secondary School Doko was used for this purpose. The subjects were 56 JSS II students. The Social Studies Academic Performance Test (SAPT) was administered to the subjects twice (as test and retest). The subjects' score in the two tests were correlated to establish the instrument's reliability coefficient.

3.5.3 Reliability of instrument

In this study, the test-retest reliability co-efficient was adopted, based on Pearson Product Moment Coefficient (PPMC). Analysis of the scores obtained from the pilot testing of the Social Studies Academic Performance Test (SAPT), established the reliability coefficient for the test instrument at 0.87. The result showed a high degree of relationship between the two test results (Bello and Ajayi, 2010). Therefore the test instrument for the study was adjudged reliable.

3.6 Procedure for Data Collection

The researcher collected an introductory letter from the department in order to intimate the principals of the schools selected for the study. An approval to conduct the research was duly given by the school managements through the education secretary, Garki Local Government Education Authority, Jigawa State. For the purpose of data collection the following procedures were followed.

3.6.1 Procedure for Treatment

The study took four weeks complete. The researcher visited the selected Schools to carry out the experiment and administer the test instrument on the study subjects; after

completion, the test scripts were collected and the scores recorded were used for statistical analysis. These steps were followed to conduct the experiment:

i. Training of research assistant.
ii. Preparation of the study subjects.
iii. Exposure of study subjects to pretest
iv. Presentation of oral instruction to control group
v. Treatment of experimental group to graphics
vi. Exposure of study subjects to posttest.

i) Training of Research Assistants

Before the commencement of the treatment, the researcher trained two research assistants. Their roles were to assist the researcher to handle the lessons in the experimental group using Graphic Media Learning Package (GMLP). Two days were earmarked for the training which involved practical demonstration by the researcher on how to conduct a graphic instructional media enhanced lesson. The research assistants were acquainted with the roles of the group head and on what was expected from group members. Similarly, they were introduced to the types of activities expected from students during the lesson. These include:

- Encouraging all members to participate actively in activities and discussion during the lesson.
- Carefully study the features depicted in the graphic displays and discuss their views with group members to be able to maximize the benefits of graphic instructional media to learning.

- Emphasizing the importance of helping each other because students who help someone else end up helping themselves to learn better

ii) Orientation of the Study Subjects

The researcher organised a brief meeting with the study subjects to acquaint them about the research work, establish a rapport, and solicit their cooperation throughout the period of the experiment.

iii) Exposure of study subjects to pretest

A pretest was administered to the study subjects in order to determine their academic comparability ability level. The Social Studies Academic Performance Test (SAPT) was administered to both the control and experimental groups to assess the study subjects' academic performance before the commencement of the experiment. The scores of the students in the pretest were compared to the posttest scores to determine the subjects' 'gained score' at the end of the experiment.

iii) Presentation of oral instruction to control group

The researcher used conventional lecture method to teach the subjects in the control group that is, exposing the subjects to lesson content through lecture method. Two public Junior Secondary Schools (JSS Kita, and JSS Kargo) were randomly selected to form the control groups. The subjects were taught using the lecture method alone. During the teaching process, the study subjects were instructed to ask questions on issues that requires further clarifications from the teacher and to copy down the important points written by teacher on the chalkboard into their exercise books. Assignment was given to the subjects after each lesson and they were encouraged to read their textbooks for further

clarifications. Two weeks was used for the oral presentation of lesson content, this comprised of two lessons per week. The duration of each lesson was 60 minutes.

iv) Treatment of experimental group to graphics

The research assistants presented the lesson contents to the experimental group through a combination of verbal instruction supplemented with a Graphic Media Learning Package. Two public Junior Secondary Schools, (JSS Garki, and JSS Kore) were randomly selected to form the experimental groups. Before the study subjects entered into the classroom for each lesson, the graphics needed for the lesson were placed on the teacher's table. After a brief introduction to the topic, the graphics depicting the concepts to be taught to the class were displayed to the students. The subjects were then instructed to carefully observe the materials and respond to the teachers' questions during the teaching activity. The graphic learning package encourages students' participation at every step of the instructional process. For instance, given the stimulus of a broad concept, 'drug', students were able to generate examples of the concept from their own understanding and experiences. Focusing questions such as "what does this word mean to you? Can you give examples of this concept and so on generates open-ended responses in which students of different intellectual abilities can participate. Students therefore create relationships in flexible manners and perceive the world, using their personal schema.

The researcher acted as facilitator and asked students focusing questions such as, can you name this objects? Why do you think that these objects belong together? Students were required to explain their reasoning and to seek clarification from each other. The students were then instructed to establish a statement of generalization, using responses

elicited from the discussions on the concept. Again two weeks was used for the treatment, this comprised of two lessons per week. Each lesson had duration of 60 minutes.

v) Administration of Posttest

At the end of the four-week treatment period, the researcher administered the posttest to both experimental and control groups (Social Studies Academic Performance Test). The test instrument contained 20 multiple choice items and each test item has four response options (A – D). The subjects were instructed to identify the correct response from the options provided. They were allowed to read through the written instructions on how to answer the test items on the question papers. Thirty minutes were allocated for the posttest as suggested by Dyel, (2011).

At the end of allocated time (30 minutes), the subjects' responses in the posttest were collected and scored using the marking scheme as shown in appendix C. Each correct response was scored 1 point with maximum score of 20 marks, while a wrong response was scored zero. The students' scores in the posttest for the two groups (Experimental and control) were recorded separately and analysed to determine the differences in the students' mean scores using the T-test software package for social science (SPSS) for independent samples.

3.7 Procedure for Data Analysis

The data collected for the study was used to answer the research questions and test the hypotheses stated in sections 1.4 and 1.5 of chapter one. Mean and standard deviation was used to answer the research questions while, T-test statistics (applying statistical package for social sciences version 15.0) was used to test hypotheses,. The rejection or retention region of the stated hypotheses was set at $P \leq 0.05$ level of significance.

CHAPTER FOUR

ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

The study investigated the Impact of Graphics on Academic Performance of Junior Secondary School Students in Social Studies in Jigawa State, Nigeria. This chapter would be presented under the following subheadings: Data Analysis, Result Presentation, Summary of Findings and Discussion.

4.2 Data Analysis

The data collected for this study was used to analyse the hypotheses and answer the research questions stated in chapter one Section 1.5. Each hypothesis was analysed as follows:

4.2.1 Analysis of Research Questions

The students' scores on the Social Studies Academic Performance Test were analysed to answer the research questions raised in section 1.4 of the study.

Research question 1: What is the impact of graphics on facilitating students' academic performance in Social Studies?

To answer this question the academic performance of students taught through lecture method was compared with that of students taught through the use of graphic instructional media. The scores recorded are presented in table 4.1 below.

Table 4.1: Impact of Graphics on Facilitating Students' Academic Performance.

Teaching method	Mean score	Standard deviation	Mean difference
Lecture method	9.97	2.774	5.72
Graphics method	15.69	1.701	

The data in table 4.1 above shows that students taught through graphics instructional media achieved higher academic performance with a mean score of 15.69 in the 20 items test in contrast to the mean score of 9.97 achieved by the students taught through lecture method (the control). This indicates that a difference of 5.72 in the mean scores between the two groups. Again the standard deviation of 1.701 in favour of the graphics method group proved that graphics instructional media can facilitate students' academic performance in Social Studies.

Research question 2: What is the impact of graphics on facilitating academic performance of rural and urban students in Social Studies?

To address the above question, the students' scores in the pretest and posttest were analysed. The students' performance is shown in the following table:

Table 4.2: Impact of Graphics on Facilitating Academic Performance of Rural and Urban Students.

Type of student	Mean score	Standard deviation	Mean difference
Rural	9.66	3.016	6.026
Urban	15.69	1.701	

The scores recorded in table 4.2 above table shows that the urban students exposed to achieve higher academic performance with a mean score of 15.69 compared to 9.66 recorded for the rural students. This shows a mean difference of 6.026 between the two groups. Also the standard deviation of 1.701 in favour of the urban students as compared to the 3.016 for the rural students, indicates that graphics facilitates higher academic performance among urban students.

Research question 3: What is the impact of graphics on facilitating academic performance of male and female students in Social Studies?

To response to this question, the scores of male and female students on the Social Studies Academic Performance Test were analysed. The scores are presented in the table below:

4.3: Impact of Graphics on Facilitating Academic Performance of Male and Female Students.

Gender	Mean score	Standard deviation	Mean difference
Male	15.75	1.678	0.219
Female	15.53	1.778	

The data presented in table 4.3 shows that both male and female students taught through graphics achieved comparable academic performance with the mean scores of 15.75 and 15.53 respectively. This indicates a mean score difference of 0.219 which is negligible. Moreover the standard deviation of 1.678 and 1.778 for the two groups

indicates that graphics are generally effective in enhancing academic performance among both male and female students.

4.2.2 Hypotheses Testing

Hypothesis 1: There is no significant difference in the mean scores of Social Studies students between those exposed to graphics and their counterparts exposed to lecture method. The posttest scores of students in the experimental and control groups were analysed using t-test statistical technique for independent samples to find out if there is a significant difference in the mean scores of the two groups. The results obtained are presented in Table 4.1 below:

Table 4.4: T-test Analysis of Mean Scores of Experimental Group and Control Group.

Variables	N	X	SD	SE	t-cal	df	sig. (2-tailed)	Remark
Lecture method	97	9.97	2.774	0.282				
					-18.449	211	0.000	*Significant
Graphic inst. Media	116	15.69	1.701	0.158				

In testing hypothesis one which stated that, there is no significant difference in the mean scores of Social Studies students between those exposed to graphics and their counterparts exposed to lecture method. The students taught using lecture method had statistically significantly lower score (9.97 ± 2.774) at the end of treatment compared to those students taught using graphic instructional materials (15.68 ± 1.701) t (211) = 18.499, p 0.000. Therefore the hypothesis which stated that, there is no significant

difference in the mean scores of Social Studies students between those exposed to graphics and their counterparts exposed to lecture method was rejected.

Hypothesis 2: There is no significant difference in mean scores of rural and urban students exposed to graphics in Social Studies. To test this hypothesis, posttest scores of rural and urban Social Studies students exposed graphics were analysed using T-test statistics. The results obtained are presented in Table 4.6 below:

Table 4.5: T-test Analysis of Mean Scores of rural and urban Social Studies students exposed to graphics.

Variables	Type of student	N	X	SD	SE	t-cal	df	Sig. (2tailed)	Remark
Acad. Perf.	Rural	116	9.66	3.016	0.280				
						-18.74	230	0.000	*Significant
	Urban	116	15.69	1.701	0.158				

In testing hypothesis two which stated that, there is no significant difference in mean scores of rural and urban Social Studies students exposed to graphics. The study found that the rural students taught using graphics instructional materials had statistically significantly lower score (9.66 ± 3.016) or (mean =9.66, SD = 3.016) at the end of the treatment compared to urban Social Studies students taught using graphics instructional materials (15.69 ± 1.701), t (230) = -18.74, p 0.000. Therefore, the hypothesis which stated that, there is no significant difference in mean scores of rural and urban Social Studies students exposed to graphics was rejected.

Hypothesis 3: There is no significant difference in the mean scores of male and female students exposed to graphics in Social Studies. To test this hypothesis, posttest scores of

male and female Social Studies students in the experimental group were compared. Again the mean scores of the students were tested using T-test statistics. The results are presented in Table 4.6 below:

Table 4.6: T-test Analysis of Mean Scores of Male and Female Students in the Experimental group.

Variables	Gender	N	X	SD	SE	t-cal	df	Sig. (2 tailed)	Remark
Graphic/Perf.	Males	84	15.75	1.678	0.183				
						0.617	114	.538	*Not significant
	Females	32	15.53	1.778	0.314				

In testing hypothesis three which stated that, there is no significant difference in the mean scores of male and female students exposed to graphics. The study found that male students taught using graphics instructional materials had statistically significant score (15.75 ± 1.678) or (mean =15.75, SD = 1.678) at the end of the treatment compared to the female students taught using graphic instructional materials score (15.53 ± 1.778), or (mean =15.53, SD = 1.778), t (144) = 0.617, p .538. Therefore, the hypothesis which stated that, there is no significant difference in the mean scores of male and female students exposed to graphics was accepted.

4.3 Summary of major Findings

The following findings were obtained in the course of this study.

1. There is a significant difference in the mean scores of the experimental group and the control group of Social Studies students (JSS II) in favour of the experimental group.

Students taught with graphics achieved higher academic performance over those taught through lecture method.

2. There is a significant difference in the mean scores of rural and urban Social Studies students exposed to graphic instructional media.

3. There is no significant difference in mean scores of male and female Social Studies students exposed to graphic instructional media.

4.4 Discussion of findings

The data collected and analyzed were based on the pre-test and post-test scores of students on Social Studies Academic Performance Test (SAPT). The scores were analyzed according to the demands the research questions, and the hypotheses formulated for the study. The discussions of the results were as follows:

The result from Table 4.1 shows that there is significant difference in the mean scores of students in favour of the experimental group. This indicates that the experimental group which was exposed to graphic instructional media performed significantly better than their counterparts in the control group who were taught using lecture method. The higher performance of the experimental group proves that the integration of graphics to teaching and learning activities was more effective over the use of lecture method of instruction alone.

The findings of the study are in conformity with studies conducted on impact graphic instructional media on improving teaching and learning (Shah, Priti and Hoeffner, 2002; Rieber, 2000; Simmons, Griffins and Kameenui, 1988; Lai and Newby, 2012; Kuo and Hooper, 2004; Hawk, 1986; Guastello, Beasley and Sinatra, 2000; and Birbili, 2006). They found out that integrating graphics to instruction is superior over the use of

traditional lecture method of teaching in enhancing students' higher academic performance. The researchers emphasized that the higher academic performance obtained from the use of graphics might be due to their appeal to students' visual abilities, motivation of learners and inducing students' active participation in instructional processes which ultimately enhance the retention of lesson content.

As reported by Lai and Newby, (2012) students taught through the use of graphics showed a remarkable gain in academic performance compared to those in the same course taught in traditional lecture format. He further pointed out that based on the cognitive theory of multimedia learning (Mayer, 2005) working memory within the human information processing system consists of both the auditory/verbal as well as the visual/pictorial channels for processing information. The use of graphics enables the teacher to present lesson content to learners through both channels. This multiplies the opportunities for learning new concepts.

The result in Table 4.2 revealed a significant difference the academic performance between rural and urban Social Studies students exposed graphic materials. The result indicates that urban students Social Studies demonstrated greater intellectual capacity in recognising of both concrete and abstract concepts after exposure to graphics. The greater academic performances of the students might be attributed to the advantages derived from the application their prior knowledge to graphics sources presented to them.

Paivio, (1990) reported that graphics facilitates the recall of linguistic materials because an image evoke an associated word. This finding is in agreement with the report by Thomas, (2001) that presenting concepts in both verbal and visual forms enhances retention, retrieval, and transfer of concepts. Therefore the better academic performance by

the urban students in the post-test could be due to the educational benefits the subjects derived from the use of graphics, via - the activation of visual memory codes in the learners, the increased interest in the lesson content and the development of harmonious relationship between the teacher and the students.

Table 4.3 indicates that there was no significant difference in the means scores of male and female students when exposed to graphics as teaching strategy. This implies that the use of graphics in teaching – learning process is gender – friendly. Meaning both sexes benefit equally from its instructional values.

Similar findings have been made by Dyel, (2011) who independently reported that boys are not better than girls in terms of educational performance, after he had independently carried out studies on sex differences and student performance at the secondary school level. On the contrary, Aigboman (2002) and Njoku (2007) independently reported that boys achieved significantly better than the girls in science, technical and mathematical subjects. This might have been attributed to the method of instruction used in teaching such subjects. A major importance of this finding is that graphic instructional media is not gender-biased.

The findings of this study establishes that the use of graphics in teaching Social Studies boost students' academic performance in the subject. Consequently, the strategy holds a viable prospect for improving teaching and learning of other subjects at Secondary School level as well.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

Specifically, this chapter was presented under the following sub-headings: Summary, Implication of the Findings for Social Studies Education, Conclusion, Recommendations and Suggestions for Further Studies.

5.2 Summary

The study investigated the Impact of Graphics on Academic Performance of Junior Secondary School Students in Social Studies in Jigawa State, Nigeria. A purposive sampling technique was used to select four co-educational Junior Secondary Schools in Garki local government area of Jigawa State. Samples of two hundred and fourteen (214) Students were also selected through stratified random sampling technique selected for the research. This comprises of one intact class from each of the schools. Out of this number, 57 students from JSS Kargo and 41 students from JSS Kita formed the control groups while 50 students from JSS Garki and 66 students from JSS Kore were used as experimental groups. The study used quasi experimental – control groups design involving pretest and posttest. The pretest was used to determine the academic achievement of the study subjects before the treatment and the posttest was administered after the experimental treatment was given to the subjects. The research instruments used in the study were Social studies Academic Performance Test (SAPT), and Graphics Media Learning Package (GMLP). The data collected from the academic performance test was analysed through t-test statistics for independent samples applying statistical package for social science (SPSS) to test hypotheses 1, 2 and 3.

5.3 Implication of the Findings for Social Studies Education

This study was carried out to find ways of reducing students' poor academic performance in Social Studies at the Junior Secondary School level. Rieber, (2000) and Lyons, (2011) observed that most teachers placed greater emphasis on the lecture method of teaching, neglecting the power of illustrations to promote learning. This attitude limits the medium through which lesson content is conveyed learners - a factor contributing immensely to students' poor academic performance.

The findings of the study have the following implications for teaching and learning of Social Studies at Junior Secondary School level:

1. Based on the results of this study which reveals students achieve higher academic performance when exposed to graphics, Social Studies teachers should improve on their methods of content delivery by employing graphics which enable students to learn better. This teaching strategy allows students to take active role in a lesson, and share ideas / experiences.

2. From the result obtained on the impact of graphics on the academic performance of rural and urban Social Studies student, it was found that graphics have a more impressive effect on urban students' academic performance apparently due to their prior experiences which made it easier for them to comprehend and integrate the images depicted in the graphics presented to them.

3. On the issue of the impact of graphics on gender differences and students' academic performance, the study revealed that both male and female students exposed to graphics performed comparatively well. This means that employing graphics could help to minimize gender bias among students in secondary schools by offering equal access to learning opportunities to both sexes.

2. From the result obtained on the impact of graphics on the academic performance of rural and urban Social Studies student, it was found that graphics have a more impressive effect on urban students' academic performance apparently due to their prior experiences which made it easier for them to comprehend and integrate the images depicted in the graphics presented to them.

5.4 Conclusion

The study has emphasized the intrinsic worth of graphics in boosting students' academic performance. Students exposed to graphics performed significantly better than those exposed to the lecture method of instruction. Again, graphics was found to be effective in enhancing the academic performance of both male and female students. Therefore incorporating graphics as a teaching strategy is a recommended recipe for the improvement of Social Studies instruction at the Junior Secondary School level.

5.5 Recommendations

The following recommendations were put forward by the researcher for a more effective Social Studies education in Nigeria Junior Secondary Schools:

1. Since this study indicates an enhanced students' academic performance when learners were exposed to graphics, its application as teaching stratagem should be encouraged among teachers of Social Studies at the JSS level.

2. Professional and research organizations such as the Social Studies Association of Nigeria (SOSAN), National Teachers' Institute (NTI) and The Nigerian Educational and Research Development Council (NERDC) that carryout seminars, workshops and conferences should incorporate themes / topics on graphics in their social studies education re-training programs for teachers at the Junior Secondary School level.

3. The Federal and State Ministry of Education should sponsor Social Studies teachers for refresher training on design, selection, and utilization of graphic instructional media.

5.6 Suggestions for Further Studies

1. Similar study could be carried out on impact of graphics on primary school pupils' long term recall of social studies concepts.

2. A similar study may also be conducted in tertiary institutions to find out the effect of graphics on the academic performance among adult learners.

REFERENCES

Abdullahi, M. (1998). *Introduction to aspects of educational technology*. Kano: Gidan Dabino Publishers.

Abimbade, A. (1999). *Principles and practice of educational technolog*y. Ibadan: International Publishers.

Adewoyin, J.A. (1999). *Introduction to educational technology*. Lagos: John-Lad Publishers Ltd.

Aigbomian, D. O., (2002). *Science for all: Implication for the teacher and national development.* Benin City. Ambik Press.

Ajelabi, A. (2005). *Production and utilisation of educational Media*. Lagos: Raytel Communication Ltd.

Alvermann, D. E., & Boothby, P. R. (1983). A preliminary investigation of the differences in children's retention of "inconsiderate" text. *Reading Psychology*, 4(4), 237-246.

Alvermann, D. E., & Boothby, P. R. (1986). Children's transfer of graphic organizers. *Reading Psychology*, 7(2), 87-100.

Anikpo, M.O., Mohammed, A.S., Ezegbe, M.O., Salau, & A.T.,Okunamari, R. U. (2008). *Basic Social studies for Junior Secondary Schools, Book 2* (UBE Edition). Ikeja: Longman Nigeria Plc.

Ausubel, A., David P., Novak, C., Joseph D., & Hanesian, H. (1978). *Educational psychology: A cognitive view.* New York: Holt, Rinehart & Winston.

Azi, J. A., (2011). *Instructional graphics.* Unpublished M. Ed lecture notes. Ahmadu Bello University, Zaria.

Baker, G., &Bixler, B. (1990). Computer-assisted design techniques for low-literate adults. *Computers in Adult Education and Training*. 2(1), 18-27.

Bell, M. J. (2012). Definition of academic performance. Retrieved June 10, 2012 from http//www.ehow.com>education

Bello, R. & Ajayi, O. (2010). *Research methods and statistical analyses*. Zaria: ABU Press.

Black, E. (1995). *Behaviorism as a learning theory*. Retrieved November 10, 2012, from: http://129.7.160.115/inst5931/Behaviorism.html

Bonnie, S. (1999). *Using graphics and pictures.* Retrieved Dec. 15, 2012, from: http://www.usask.ca/education/course/skaalid/page/page.htm

Bulgren, J. A., Lenz, B. K., Schumaker, J. B., Deshler, D. D. & Marquis, J. G. (2002). The use and effectiveness of comparison routine in diverse secondary content classrooms. *Journal of Educational Psychology, 94* (2) 356-371.

Bulgren, J. A., Schumaker, J. B& Deshler, D. D. (1988). Effectiveness of a concept teaching routine in enhancing the performance of students in secondary mainstream classes. *Learning Disability Quarterly, 11* (1) 3-17.

Bulgren, J., & Lenz K. (1996). Strategic instruction in the content areas. In Deshler, D. D., and Lenz, B. K. (1999). The strategies instructional approach. *International Journal of Disability, Development and Education,* 30(2), 103-114. Retrieved November 10, 2012, from: http://dx.doi.org/10.1007/BF02504673

Cherry, K. (2012). .*Jungian learning styles*. Retrieved, May 19, 2013 from: http://www.psychology.about.com>about.com>education>psychology.

Clark, B. (2009). *The history of instructional design and technology*. Retrieved march 15, 2012, from: http://www.slideshare.net/benton44/history-of-instructional-design-and-technology? from=embed

Clark, J. M., & Paivio, A. (1991). Dual coding theory and education. *Educational Psychology Review* 3:152.

Clark, R. C. (2010).*Graphics for learning*. Retrieved December 16, 2012, from: http://googlebooks.com

Clark, R.C. & Lyons, C. (2004).*Graphics for learning: Proven guidelines for planning, designing, and evaluating visuals in training Materials*. Retrieved December 16, 2012, from: http://www.amazone.com.design

Clark, R.C., & Mayer, R.E. (2002). *e-Learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning*. San Francisco: Pfeiffer.

Deshler, D. D., & Lenz, B. K. (1989). The Strategies Instructional Approach. *International Journal of Disability, Development and Education,* 36(3), 203-224. Retrieved January 10, 2013, from: http://dx.doi.org/10.1007/BF02504673

Driskell, J. E., Copper, C., & Moran, A. (1994). Does mental practice enhance performance? *Journal of Applied Psychology, 79*, 481–492.

Duchastel, P. C. (1978). *Illustrating instructional texts*. New York: Longman.

Dwyer, F. M. (1978). *Strategies for improving visual learning*. State College, PA: Learning Services Press.

Dyel, B. D. (2011). *Effects of cooperative learning strategy on academic performance and attitude of basic science students in a large class.* Unpublished M.Ed. Thesis. Ahmadu Bello University, Zaria.

Ellis, E. S. (2001). Makes *sense strategies: Connecting teaching, learning and assessment*. Tuscaloosa: Masterminds Publishing.

E-Learning Coach. (2012).*Using Graphics to Improve Learning.* Retrieved December 15, 2012 from: http//: www. e-learning coach.com.htm.

Federal Republic of Nigeria. (2004). *National policy of education* (4th Ed.) Abuja: Federal Ministry of Education.

Fleming, M. & Levie, W.H. (Ed.). (1993). *Instructional message design: Principles from the behavioural and cognitive sciences*. Englewood Cliffs, N.J: Educational Technology Publications.

Gagné, R. M. (1985). *The Conditions of learning.* (4th Ed.). New York: Holt, Rinehart &Winston.

George-Palilonis, A., & Jennifer, B.,(2006). *A practical guide to graphics reporting: Graphics for print web & broadcast.* Burlington: Focal/Elsevier.

Good, T. L., Brophy, J. E. (1990). *Educational psychology: A realistic approach.* White Plains, New York: Longman

Guastello, E. F., Beasley, T. M. & Sinatra, R. C. (2000). Concept mapping effects on science content comprehension of low-achieving inner-city seventh graders. *Journal* of *Remedial and Special Education, 20*(6), 356-364.

Hawk, P. (1986). Using graphic organizers to increase achievement in middle school life science. *Science Education, 7*0(1), pp. 81-87.

Heinich A., Modenda H., Rusell R., & Smaldinot. A., (1999). *Integrating technology into curriculum.* Retrieved February 10, 2013 from: http:// ed205.net/assure.html

Höffler T., & Leutner D. (2007). *Instructional animation versus static pictures: A meta analysis* In *Learning and Instruction,* 17(6), 7227 Retrieved August 30, 2012, from: http://dx.doi.org/10.1016/j.learninstruc.2007.09.013.

Lane, C. (2013).*Gardner's multiple intelligences*. Retrieved May 20, 2013, from: http://www.tecweb.org/style/gardner.html.

Illian, k. (2012*). Best practices of graphic design* (Image). Denver: University of Colorado. Retrieved October 7, 2011, from: http//www. Instructionaldesign.org/theories/component display.html.

Jonassen, D. H. (1991). Objectivism versus constructivism: Do we need a new philosophical paradigm? *Educational Technology Research and Development*, 39 (3), 5-14.

Jiskha.com. (2012). *Homework help: Visual arts: Principles & elements of design*. Retrieved February 13, 2013, from: http://www.jiskha.com/art/visual-arts/ped.html

Joseph, E. (2009). Emotion, memory, and the brain. *Microsoft Encarta Encyclopedia*. New York: Microsoft Corp.

Kuo, M. A. & Hooper, S. (2004). The effects of visual and verbal coding mnemonics on Learning Chinese characters in computer-based instruction. *Educational Technology Research and Development*, 52(3), 23-38. Retrieved December 12, 2012 from: http://dx.doi.org/10.1007/BF02504673

Mergel, B. (1998). *Instructional design & learning theory*. Retrieved December 19, 2012, from: http://www.usask.ca/education/coursework/802papers/mergel/mergel.pdf

.

Lai, F. Q., & Newby, T. J. (2012). Impact of static graphic, animated graphics and mental imagery on a complex learning task. *Australasian Journal of Educational Technology*, 28(1), 91 104. Retrieved December 24, 2012, from: http://www.ascilite.org.au/ajet/ajet28/lai.html

Lester, P (2000). *Visual Communication: Images with messages (2nd ed*.) Belmont Wadsworth Pub. Co.

Lyons, C. (2011). *More than just eye candy: Graphics for e-learning*. Retrieved December 16, 2012, from: http:// chopeta.com/news.php?Article=art03

Macdonald-Ross, M. (1977). Graphics in text. *Review of Research in Education, Learning Disability Quarterly*, *11* (1) 3-17.

Marzano, R. J., (1998). *A Theory-based meta-analysis of research on instruction.* Aurora, Co: Mid-continent Educational Research Laboratory. Retrieved November 12, 2005, Fromhttp://www.mcrel.org/PDF/Instruction/5982RR_InstructionMeta_Analysis.pdf

Marzano, R. J., Pickering, A., Debra, J., Pollock, S., & Jane, E. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement.* Alexandria, Association for Supervision and Curriculum Development.

Mayer, R. E. (2001). *Multimedia learning*. New York: Cambridge University Press.

Mayer, R. E. (2008). *Learning and instruction*. (2nd Ed). New York: Merrill Prentice.

Mayer, R. E., Hegarty, M., Mayer, S. & Campbell, J. (2005). When static media promote learning: Annotated illustrations versus narrated animations in multimedia instruction. *Journal of Experimental Psychology: Applied,* 11(4), 256-265. Retrieved February 10, 2012, from: http://dx.doi.org/10.1037/1076-89X.11.4.256

McAleese, R. (1998). The knowledge arena as an extension to the concept map: reflection in action. *Interactive Learning Environments, 6*(3), pp. 251-272.

Michas, C., Berry, T., & Dianne C. (2001). "Learning a procedural task: effectiveness of multimedia presentations."*Applied Cognitive Psychology* 14:555–575.

Merrill, M. D. (1991). Constructivism and instructional design. *Educational Technology,* 45-53.Retrieved September 22, 2013, from: http://www.gwu.edu/~tip/military.html

Miller, W. P. and Birch, R. E. (2007). The influence of type of high school attended on university academic performance. Retrieved December 3, 2008 from http//ww3.interscience.journal/wiley.com/118538313

Mudasir, H. & Aqueel, A. (2012). Essentials of instructional technology. Retrieved January 20, 2013, from: http:// www.sciencepub.net/book/050-0705/1-66.pdf

National Drugs Law Enforcement Agency (2010). Psychotropic substance abuse for patent medicine dealers in jigawa state (pamphlet). Dutse: NDLEA

Ndagi, A. (1984). In Bello, R. and Ajayi, O. (2010). *Research methods and statistical analyses.* Zaria: ABU Press.

Newby, T. & Lai, F.Q. (2008). Instructional graphics: Effectiveness of single versus gradient static graphics. *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2008* (pp. 4321-4325). Retrieved December 12, 2012, from: http://editlib.org/p/28984

Nigerian Educational Research and Development Council. (2007). *9-Year basic educationcurriculum social studies for JS 1-3.* Abuja: Universal Basic Education Commission

Njoku, Z. C. (2007). Engendering learning equity in science and technology classrooms for sustainable development. *Proceedings of the 50th Anniversary Conference of Science Teachers Association of Nigeria*. Lagos: Heinemann Educational Books (Nig.) Plc.

Novak, J. D., & Gowin, D. B. (1984). *Learning how to learn.* Cambridge: Cambridge University Press.

Occupational Safety & Health Administration. (2012). *Graphics presentation techniques*. Retrieved December 15, 2012 from: http: // www.osha.gov.

Okam, C. C. (2002). *Reading in new development in Nigeria Education: Issues and highlights*. Jos: Deka Publishers.

Okonkwo, M. E. (2000) The problem of producing effective citizens in Nigeria through social studies education: some of the major issues involved and prospects for improvement and advance. A paper presented at Abeokuta, SOSAN Conference.

Ololobou, Y. P. S. (1989) Social studies: The search for definition. *Nigeria Journal of Social Studies*. Vol. 1

Paivio, A. (1986). *Mental representations: A dual coding approach* (image). New York: Oxford University Press.

Paivio, A. & Clack, J. M. (1991). Dual coding theory and education. *Educational Psychology Review*, vol. 3 No. 3, p. 152

Paivio, A. (2007). *Mind and its evolution: A dual coding theoretical approach.* Mahwah, NJ: Erlbaum.

Paivio, A. (1991). Dual Coding theory: Retrospect and current status. *Canadian Journal of Psychology, 45*(3), 255-287.

Price, F., & Oswald, A. (2008). *Types of Quasi-Experiments*. Retrieved March 30, 2014. from: <http://www.csufresno.edu/CSUF/disclaimer/index.html>

Perry, J. D. (2001). *Learning and cognition*. Retrieved December 12, 2012. from: http://education.indiana.edu/~p540/webcourse/gagne.html.

Rieber, L. (2000). *Computer, graphics, and learning*. Retrieved on December 16, 2012, from http//: www.nowhereroad.com.cgl/chapter 2/index.htm.

Rikichi, F. E. (2011). *An assessment of implementation of social studies curriculum for effective citizenship in primary schools in Kaduna State.* Unpublished M.ed. Thesis. ABU Zaria.

Roberson, C. (2012).*The Importance of graphic organisers*. Retrieved on December 11, 2012 from: http: //www. eHow.com.

Roediger, H.L. (2009). Memory. *Microsoft Encarta Encyclopedia*. New York: Microsoft Corporation.

Ryu, J., Lai, T., Colaric, A., & Cawley, J. (2000). *Dual coding theory. Educational Psychology.*No.252. Retrieved April 27, 2013. From http://www.iteach.saintleo.educ/instructionaldesign/index.html

Sadoski, M. (2012). *Dual coding theory*. Retrieved Febuary20, 2013. from: http//:www.education.conference.com/reference/article/dual coding theory/#A

Sadoski, M., & Paivio, A. (2001). *Imagery and text: A dual coding theory of reading and writing.* Mahwah, NJ: Erlbaum.

Sadoski, M., & Paivio, A. (2004). A Dual Coding Theoretical Model of Reading. *Theoretical Models and Processes of Reading* (5th ed.), pp. 1329– 1362. Newark, DE: International Reading Association.

Sambo, A. A. (2008). *Statistical principles for research in education and social sciences*. Zaria: S. Asekome & Co Publishers. P.388

Shah, A., Priti, T., & Hoeffner, H. (2002). Review of graph comprehension research: implications for instruction. *Educational Psychology Review* 14:47–49.

Simmons, D. C., Griffin, C. C., & Kameenui, E. J. (1988). The effects of teacher constructed graphic organizer instruction on sixth grade science students' comprehension and recall. *Journal of Educational Research, 28* (1), 32 -37

Thomas, J. (2010). *Dual coding and common coding theories*. Retrieved Feb.10, 2013 from: http://plato-stadford.edu/edu/cgl?entry=mental-imagery

Thompson, T. (2010). *Using split-half reliability with tests*. Retrieved February 24, 2014 from: tom.thompson@state.or.us

Tversky, B., Morrison, J. B. & Betrancourt, M. (2002). Animation: Can it facilitate? *International Journal of Human-Computer Studies,* 57, 247-262.Retrieved December12, 2012. from: http://dx.doi.org/10.1006/ijhc.2002.1017

Ughamadu, K. A. (1998). *Educational technology: Concepts, principles, and applications.* Agbor: Kmensua Educational Publishers.

Vanderstoep, S. W.; Fagerlin, A.; & Feenstra, J. S. (2000). "What do students remember from introductory psychology?" *Teaching of Psychology* 27:89–92.Volume 2317/2002, 327-335.Berlin: Springer-Verlag. Retrieved October 22, 2005. from: http://dx.doi.org/10.1007/3-540-

Ward, A. (1996). Achievement and ability tests – definition of the domain. *Journal of Educational Measurement vol. 2* American University Press.

Yusuf, K. (2009). *Elements of educational measurement and evaluation*. Zaria: Tamaza Publishing Co. Ltd.

Yusuf, A. (2010). Inter – relationship among academic performance, academic achievement and learning outcomes. Ilorin: university press.

APPENDICES
APPENDIX A

SOCIAL STUDIES ACADEMIC PERFORMANCE TEST (SAPT) FOR JUNIOR SECONDARY SCHOOL STUDENTS (JSS II)

Time allowed: 30 minutes

Dear Respondent,

The purpose of the test is purely for research and not to test you or your school's performance. Your honest response will be a contribution to the improvement of Social Studies programme in Nigeria. Read the questions carefully. Each question is followed by four options (A-D). One option is correct. You are to tick the correct option on your answer sheet.

1. The consumption of a drug or any other substance in excess of what is normally required is called_____

A. drug dependence B. addiction C. drug abuse D. prescription

2. _____ is a natural or artificial substance given to treat and prevent disease.

A. pure water B. air C. petrol D. drug

3. All the following are negative effects of drug abuse except_____

A. Laziness and hatred for work B. road accidents C. respect for law and order

D. damages to liver, lungs, and kidney.

4. --------- is a condition that occurs when a person becomes physically or psychologically dependent on drugs.

A) Drug trafficking B) Drug addiction C) Drug hawking D) Drug abuse

5. Which of the following is not among type of drugs?

A. milk B. stimulants C. pain killers D. hallucination producing chemicals

6. Stimulants produces all the following effects on the minds of drug addicts except ----------

A) Hyperactivity B) euphoria C) anxiety D) dullness

7. Drugs are usually abused to produce the following feelings in the mind of addicts except _____

A. relaxation B. frustration C. happiness D. relief from worry

8. Drug abuse can be prevented through one of the following control measures:

A. Political campaigns B. organizing soccer competitions

C. enlightening the youth on the dangers of drug abuse D. giving more money to the youth.

9. Taking medications not prescribed by a medical doctor is a form of_____

A. exercise B. learning C. drug abuse D. experience.

10. Which of these does not lead to drug abuse?

A. Close association with drug addicts B. Easy access to drugs C. Ignorance

D. Strict vigilance at seaports

11. N.D.L.E.A is an abbreviation for _____

A. Nigeria development law agency B. National drug law enforcement agency C. national law empowerment agency D. Nigeria drug law enforcement authority

12. Which of these is not an intoxicating substance?

A. cocaine B. chocolate C. heroin D. marijuana

13. Which of the following does not belong to behavioral signs of drug abuse?

A) Higher academic performance B) Unexplained need for money or financial problem

C) Engaging in secretive or suspicious behaviour. D) Sudden change in friends.

14. ---------- are the main target group of preventive measures against drug abuse.

A. Old people B. Youth C. Handicap D. Children.

15. Which of following leads to increase in crimes rate and social vices?

A. discipline B. drug abuse C. drugs control D. Advancement in knowledge

16 ---------- Could have depressing effects on drug users.

A. Marijuana B. Kola nut C. Valium D. Cocaine

17. All the followings are inhalants except ---------

A) Glues B) aerosols C) petrol vapors D) capsules

18. Drugs are smuggled into the country through ----------

A) Seaports B) airports C) border posts D) all of the above

19. Prolong abuse of drugs leads to ----------

A. drug awareness B. drug addiction C. drug acceptance D. drug withdrawal

20. Which these individuals do not contribute toward curbing the menace of drug abuse?

A. law enforcement agents B. parents C. teachers D. drug hawkers

APPENDIX B

SOCIAL STUDIES ACADEMIC PERFORMANCE TEST (SAPT)

ANSWER SHEET

Instruction

Read each question carefully and the four possible answers provided after each question. Select one from the four options as your answer to the question and enter it on the answer sheet by shading the letter A, B.C or D that corresponds to your choice. Example:

Supposing you choose letter B for question 1, then you should cross letter B as shown:

1 A ~~B~~ C D.

School_____

Class_____

1. =A= =B= =C= =D=
2. =A= =B= =C= =D=
3. =A= =B= =C= =D=
4. =A= =B= =C= =D=
5. =A= =B= =C= =D=
6. =A= =B= =C= =D=
7. =A= =B= =C= =D=
8. =A= =B= =C= =D=
9. =A= =B= =C= =D=
10. =A= =B= =C= =D=
11. =A= =B= =C= =D=
12. =A= =B= =C= =D=
13. =A= =B= =C= =D=
14. =A= =B= =C= =D=
15. =A= =B= =C= =D=
16. =A= =B= =C= =D=
17. =A= =B= =C= =D=
18. =A= =B= =C= =D=
19. =A= =B= =C= =D=
20. =A= =B= =C= =D=

APPENDIX C

MARKING SCHEME FOR SOCIAL STUDIES ACADEMIC PERFORMANCE TEST (SAPT)

1. C

2. D

3. C

4. B

5. A

6. D

7. B

8. C

9. C

10. D

11. B

12. B

13. A

14. B

15. B

16. C

17. D

18. D

19. B

20. D

1 Mark each x 20 = 20 marks

APPENDIX D

LESSON NOTES FOR EXPERIMENTAL GROUP

LESSON NOTE ONE

INSTRUCTIONAL STRATEGY: EXPOSURE TO GRAPHIC INSTRUCTIONALMEDIA.

SUBJECT: SOCIAL STUDIES

LESSON 1: UNIT 2

GROUP: EXPERIMENTAL GROUP

CLASS: JSS II

UNIT TITLE: SOCIAL ISSUES AND PROBLEMS

NO. OF STUDENTS IN CLASS: 48

TIME: DOUBLE PERIOD (2 HOURS)

TOPIC: DRUG ABUSE

INSTRUCTIONAL MATERIALS: Graphic display on some commonly abused drugs.

BEHAVIOURAL OBJECTIVES: By the end of the lesson students should be able to:

(i) Define drug abuse

(ii) List two commonly abused of drug abused

(iii) Identify two causes of drug abuse

(iv)Name two behavioural signs of drug abuse.

PREVIOUS KNOWLEDGE: Students have learnt about societal values.

INTRODUCTION: The teacher will ask the students the following oral questions.

(i) What are societal values?

(ii) What will happen if people discard their societal values?

PRESENTATION OF LESSON

With the aid of graphic instructional media, the teacher will present the lesson as follows:-

STEP I: The teacher will define drug as a natural or artificial substance given to treat or prevent disease or lessen pain. Drug abuse is consumption of a drug or any other substance in excess of what is normally required. It is the use of drugs or substances in a wrong way. It can also be described as the act of taking drugs not prescribed by a physician. Drug abuse often leads to drug addiction, a condition that occurs when a person becomes physically or psychologically dependent on drugs.

STEP II: Teacher will present a graphic display of some commonly of drug abused and explain their effects on human body as follows:

i. Marijuana: Glassy, red eyes; loud talking, inappropriate laughter followed by sleepiness; loss of interest, motivation; weight gain or loss.
ii. Depressants (such as Valium): Contracted pupils; drunk-like; difficulty concentrating; clumsiness; poor judgment; slurred speech; sleepiness.
iii. Stimulants (including amphetamines, cocaine etc.): Dilated pupils; hyperactivity; euphoria; irritability; anxiety; excessive talking followed by depression or excessive sleeping at odd times; may go long periods of time without eating or sleeping; weight loss; dry mouth and nose.
iv. Inhalants (glues, aerosols, vapors): Watery eyes; impaired vision, memory and thought; secretions from the nose or rashes around the nose and mouth; headaches and nausea; appearance of intoxication; drowsiness; poor muscle control; changes in appetite; anxiety; irritability; lots of cans/aerosols in the trash.

v. Hallucinogens : Dilated pupils; bizarre and irrational behavior including aggression, hallucinations; mood swings; detachment from people; absorption with self or other objects, slurred speech; confusion.

vi. Heroin: Contracted pupils, no response of pupils to light, needle marks, sleeping at unusual times, sweating, vomiting, coughing, sniffling, twitching, and loss of appetite.

These drugs are usually abused to produce desired effects on the mind of user, such as feeling of relaxation, happiness, or relief from worry.

STEP III: Teacher will further explain to students the causes of drug abuse as follows:

a) Close association to those who abuse drugs can cause someone to abuse drug.
b) Anxiety, frustration, and personal problems may cause drug abuse as an easy escape from these challenges.
c) Ready access to drugs may tempt person into drug abuse.

STEP IV: The teacher will list some signs / symptoms drugs abuse as follows:

1. Physical signs of drug abuse

i. Bloodshot eyes, pupils larger or smaller than usual.
ii. Changes in appetite or sleep patterns. Sudden weight loss or weight gain.
iii. Deterioration of physical appearance, personal grooming habits.
iv. Unusual smells on breath, body, or clothing.
v. Tremors, slurred speech, or impaired coordination.

2. Behavioral signs of drug abuse

i. Drop in attendance and performance at work or school.
ii. Unexplained need for money or financial problems (may borrow or steal to get it).

iii. Engaging in secretive or suspicious behaviour.

iv. Sudden change in friends, favorite hangouts, and hobbies

v. Frequently getting into trouble (fights, accidents, illegal activities)

3. Psychological signs of drug abuse

i. Unexplained change in personality or attitude

ii. Sudden mood swings, irritability, or angry outbursts

iii. Periods of unusual hyperactivity, agitation, or giddiness

iv. Appears fearful, anxious, or paranoid, with no reason

STEP V: Teacher will instruct the students to identify some of the drugs displayed in step (II) above and their effects on the body and mind of a person that abused them.

EVALUATION: The teacher will evaluate the students through the following questions:

i. What is a drug?

ii. What is drug abuse?

iii. Mention two common drugs abused

iv. Identify two causes of drug abuse

CONCLUSION: The teacher will conclude the lesson by explaining to the students briefly, the main points in the lesson that is, meaning of drug abuse, the different types of drug abused, and causes of drug abuse. Teacher will inform the students that the next topic will be on the effects of drug abuse.

ASSIGNMENT: Reproduce the pictures of drugs commonly abused displayed in the lesson on a drawing paper.

LESSON NOTE TWO

INSTRUCTIONAL STRATEGY: EXPOSURE TO GRAPHIC INSTRUCTIONAL MEDIA.

SUBJECT: SOCIAL STUDIES

LESSON 2: UNIT 2

GROUP: EXPERIMENTAL GROUP

CLASS: JSS II

UNIT TITLE: SOCIAL ISSUES AND PROBLEMS

NO. OF STUDENTS IN CLASS: 48

TIME: DOUBLE PERIOD (2 HOURS)

TOPIC: EFFECTS OF DRUG ABUSE

INSTRUCTIONAL MATERIALS: Graphic display on effects of drug abuse and the modes of drugs abuse.

BEHAVIOURAL OBJECTIVES: By the end of the lesson students should be able to:

(i) Mention at least two modes of drugs abuse.

(ii) List at least two effects of drug abuse

(iii) Identify at least two preventive measures against drug abuse.

PREVIOUS KNOWLEDGE: The students have learnt about the meaning of drug abuse.

INTRODUCTION: The teacher will ask the students the following oral questions:

(i) What is drug abuse?

(ii) Mention two causes of drug abuse?

PRESENTATION OF LESSON

With the aid of graphic instructional media, the teacher will present the lesson as follows:-

STEP I: The teacher will enumerate modes of drugs abuse:

a) Taking drugs not prescribed by medical doctor.

b) Taking hard drugs like marijuana, heroin and cocaine.

c) Taking easily available substances such as analgesic tablets, etc. too frequently.

The method of drug administrating could be through oral intake, inhalation, or injection, depending on the substance to be consumed.

STEP II: With the aid graphic display, teacher will list and explain the major effects of drugs abuse as follows:

a) A person who is regularly involved in drug abuse may develop mental problems.

b) Drugs abuse could lead to ghastly road accidents.

c) Excessive smoking damages the lungs ruins the health of smokers for life.

d) Those who engage in drug abuse often exhibits laziness and hatred for work.

e) Increase in crimes rate and social vices.

f) Spread of infectious diseases including HIV/AIDS.

STEP III: Teacher will outline some preventive measures against drug abuse as follows:

a) Young people should be educated from a very early age (about ten years or earlier) on the dangers of drugs abuse. The youth are principal target preventive measures of against drug abuse.

b) The general public, parents, and teachers should be educated on drug abuse so that they can help the young people in their care.

c) The mass media should launch a vigorous campaign against drug abuse.

d) Strict vigilance at our ports of entry (seaports, airports, and border posts) to reduce the incidence of drug trafficking.

e) The establishing offices of National Drug Law Enforcement Agency in local government headquarters nationwide to tackle drug trafficking.

STEP IV: The teacher will display a graphic visual on the modes of drug abuse - Via oral intake, smoking, inhalation, and injection. The students would be asked to carefully observe the elements in the drawing to enable them to analyze the effects of each mode of drug abuse on human body.

STEP V: The teacher will lead the students to discuss the implications of the effects of drug abuse as presented in step (II) above on the drug addict and society at large.

EVALUATION: The teacher will assess the students through the following questions:

a) Mention two modes of drug abuse.
b) Enumerate three effects of drug abuse.
c) Identify three preventive measures against drug abuse.

CONCLUSION: The teacher will conclude the lesson by reviewing the key points on the effects and preventive measures of drug abuse as discussed in the lesson. The teacher will then inform the students that the next topic will be on child abuse.

ASSIGNMENT: Draw a picture of one negative effect drug abuse, and state two ways to avoid it.

APPENDIX E

Research Hypotheses Testing Using Software Package for Social Sciences

H_0 1

T-TEST

Group Statistics

	TEACHING METHOD	N	Mean	Std. Deviation	Std. Error Mean
MEAN SCORE	LECTURE METHOD	97	9.97	2.774	.282
	GRAPHIC INSTRUCTIONAL MEDIA	116	15.69	1.701	.158

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
MEAN SCORE	Equal variances assumed	22.889	.000	-18.449	211	.000	-5.721	.310	-6.332	-5.109
	Equal variances not assumed			-17.713	153.22	.000	-5.721	.323	-6.359	-5.083

H_O 2

T- TEST

Group Statistics

	Students' Location	N	Mean	Std Deviation	Std Error Mean
Academic Performance	Rural	116	9.66	3.016	.280
	Urban	116	15.69	1.701	.158

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
ACADEMIC PERFORMANCE	Equal variances assumed	34.212	.000	-18.74	230	.000	-6.026	.321	-6.659	-5.392
	Equal variances not assumed			-18.74	181.5	.000	-6.026	.321	-6.660	-5.392

H_0 3

T-TEST

Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
GRAPHIC PERFORMANCE	MALE	84	15.75	1.678	.183
	FEMALE	32	15.53	1.778	.314

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
GRAPHIC PERFORMANCE	Equal variances assumed	.093	.761	.617	114	.538	.219	.354	-.483	.921
	Equal variances not assumed			.601	53.325	.550	.219	.364	-.511	.948

APPENDIX F

Letter to Education Secretary, Garki Local Govt. Education Authority, Jigawa State.

Dept. of Educational Foundations and Curriculum Studies,
Faculty of Education,
Ahmadu Bello University Zaria,
12th July, 2014

The Education Secretary,
Garki Local Govt. Education Authority,
Jigawa State.

Sir,

STUDENT FIELD RESEARCH

I am a postgraduate student (M.Ed. Instructional Technology) at Ahmadu Bello University Zaria carrying out a research project titled: **"Impact of Graphics on Academic Performance of Junior Secondary School Students in Social Studies in Jigawa State, Nigeria".**

I therefore solicit the cooperation of Garki LGEA to allow me access to relevant documents and the use of some periods as well as students in the following sampled junior secondary schools: JSS Garki, JSS Kore, JSS Kita and JSS Kargo for the duration of four weeks specifically for the purpose of the research project.

Best regards.

Yours Faithfully,

Faruk Inuwa.