



Dissertation By
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EDUCATION OF
KENYATTA UNIVERSITY

**Differential Perceptual Learning Style
Preferences among Pupils in Selected
Public Secondary Schools in Kenya**

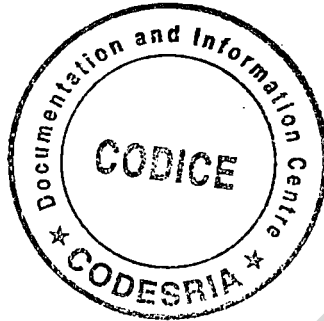
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**DIFFERENTIAL PERCEPTUAL LEARNING STYLE PREFERENCES
AMONG PUPILS IN SELECTED PUBLIC SECONDARY SCHOOLS IN
KENYA**



ONYANGO CAROLYNE AWINO

**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENT FOR THE DEGREE OF MASTER OF EDUCATION OF
KENYATTA UNIVERSITY**

OCTOBER 2004


Declaration

This thesis is my original work and has not been presented for a degree in any other University or any other award.

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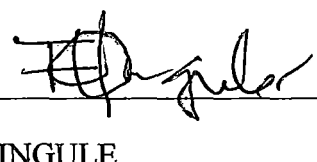
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To my parents: *Japuonj* Samson Onyango Alai, and the late Julia Onyango

in gratitude

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Acknowledgement

My heartfelt appreciation goes to the Council for the Development of Social Science Research in Africa (CODESRIA) for providing the grant that financed this study, and to the Organization for Social Science Research in Eastern and Southern Africa (OSSREA) for exposing research to me especially during the Research Methodology training in Addis Ababa. I am grateful to Prof. F. M. Okatcha and Dr. F. O. Ingule for their input as my supervisors, and to Prof. A. Nwoye for his invaluable criticisms. I am indebted to the late Prof. P. M. Musau, Prof. Z. Ogutu (KU), Dr. M. Khayesi (WHO) and Dr. J. O. Onjala (UoN) for initiating my interest in research as an undergraduate student. Special thanks to ‘comrades’ Okaka, Wambua, and Francis Kibui. I must thank Bondo District Education officer, Mr. Samson Wasonga and the Staffing officer, Mr. Charana, J. K, Mrs. Sarah Madialo, Mr. Jorum Ogal and all head-teachers including the anonymous secretary at Maranda High for their assistance during data collection. Thumbs up to daughter Elsie, hubby Monsieur Jacques and Eva-Adhiambo for their forbearance during the study period. Lastly, I shall never thank God enough for His Grace, so sufficient and Provision, so abundant during my time of need. To God be the Glory, Great things He hath done.

Carolyne L. Awino Onyango

Abbreviations

BOG	-	Board of Governors
CESA	-	Comprehensive Education Sector Analysis
EFA	-	Education for All
FGD(s)	-	Focus Group Discussion(s)
GER	-	Gross Enrollment Rate
GoK	-	Government of Kenya
KU	-	Kenyatta University
IBE	-	International Bureau of Education
IPAR		Institute of Policy Analysis and Research
KCPE		Kenya Certificate of Primary Education
KCSE		Kenya Certificate of Secondary Education
LSP(s)		Learning Style Preference(s)
UNESCO		United Nations Educational Scientific and Cultural Organization
UNICEF		United Nations Children's Fund
UoN		University of Nairobi
WHO		World Health Organization

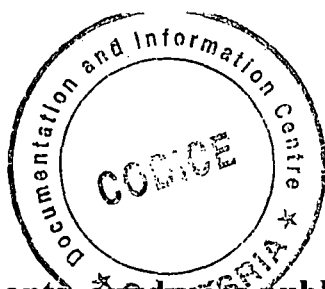
Abstract

Differential Perceptual Learning Style Preferences among Pupils in Selected Public Secondary Schools in Kenya

This study examined variability in perceptual learning style preferences among secondary school pupils in Bondo District, Kenya. Perceptual, rather than personality or instructional learning styles, was selected because it represents the primary means of receiving stimuli through one's senses before interpretation. Participants were 200 male and 175 female Form Three (N=375) pupils attending 8 public secondary schools in Bondo District. It was hypothesized that there would be variability in learners' tendency to be Visual, Auditory or Kinesthetic oriented, and that a relationship existed among learning style preferences (LSPs), academic performance, age, gender and school residential status of pupil. It was further hypothesized that variability would remain significant after considering home background random effects. This was a correlation study. The dependent variable was normalized test scores in internal and external examinations. Perceptual Learning Style Questionnaire (structured) was administered to identify learning preferences, whereas preferences on teaching modality were identified using Teaching Styles Questionnaire. Structured and unstructured in-depth interviews (10) and one focus group discussion provided complementary data. Chi-square tests, Correlation coefficients, One-Way ANOVA, Independent samples t-test, and Multiple Square Correlation ($\alpha=0.05$) were used to analyze data with the help of Statistical Package for the Social Sciences (SPSS) versions

10.0 and 11.0. Findings revealed significant variability in perceptual learning style preferences (Visual; mean=10.14, SD=2.2, Auditory; mean= 5.13, SD=1.8, Kinesthetic, mean=4.67, SD=1.8) of the pupils (N=372). A significant relationship ($p<0.01$) was found between LSPs and age; younger students tended to be more kinesthetic and auditory-oriented while older learners were more visual-oriented. Relationships among LSPs, sex of the pupil (1=male, 2=female) and academic achievement were generally negative although not significant at $p=0.05$. There was a strong negative relationship ($r= -0.31$, $p<0.01$) between sex and academic achievement of the pupil. In studying the combined effect of LSPs and school residential status on academic achievement, the study found a significant *main effect* of residential status on achievement in Languages. Boarding pupils did better in English and Kiswahili than their day-schooling counterparts. These findings confirm that individual learners are different and are consistent in the way they internalize, process and remember information. Learners should be helped to identify these differences so that they can learn new and difficult material in ways concordant with their preferences, for more effective learning. Parents, teachers and policy-makers can benefit from this finding in diagnosing learning weaknesses in order to create a more conducive learning environment and provide compatible learning experiences that accommodate learners' identified perceptual strengths, and be wary of decisions and actions that hamper the learners' educational progress.

(Key words: learning style, learner, learning achievement)



Préférences d'apprenants aux lycées publiques kenyans par rapport aux stratégies perceptuelles différentielles d'apprentissage

cette enquête a étudié la variabilité dans les préférences des lycéens par rapport aux stratégies perceptuelles différentielles d'apprentissage dans le département (district) kenyan de Bondo. Nous avons opté pour la stratégie perceptuelle, qui s'oppose aux stratégies instructionnelles et de personnalité, parce qu'elle est une méthode primaire de recevoir les stimuli avant de les interpréter. 35 apprenants ont participé dans l'enquête, dont 200 étudiants (garçons) et 175 étudiantes (filles). Nous (N=375) sommes en troisième année dans les huit (8) lycées publiques concernées. Notre hypothèse de départ prévoyait une variabilité dans les tendances des apprenants à être plus visuel, auditif ou kinesthétique ; et elle prévoyait une corrélation entre les stratégies individuelles d'apprentissage, la performance académique, l'âge, le sexe et le statut résidentiel (internat ou externat) du lycéen. Notre deuxième hypothèse était que les facteurs d'âge et d'origine socio-économique renforceraient cette variabilité. Celle-ci étant une étude corrélationnelle, le dépendant était les notes normalisées des examens internes et externes. Nous avons employé un questionnaire d'apprentissage perceptuel pour identifier les préférences individuelles d'apprentissage et un différent questionnaire de stratégie d'enseignement pour identifier les préférences des enseignants. Dix(10) interviews détaillées et une discussion focalisée de groupe nous ont fourni des données complémentaires. Les données ont été analysées à l'aide de tests chi-square, à l'aide de tests de coefficient de corrélation, ANOVA (analyse de variance), de tests-t sur corpus indépendant, et de tests de corrélation au carré multiple ($\alpha = 0,05$). Ces tests ont été utilisés avec les versions 10,0 et 11,0 du logiciel SPSS et les résultats montrent des variabilités significatives dans les stratégies personnelles perceptuelles d'apprentissage (visuelle : moyenne = 10,14 ; déviation standard = 2,2 ; auditive : moyenne = 5,13 ; DS = 1,8 ; kinesthétique : moyenne = 4,67, DS = 1,8) chez les apprenants (N= 372). On a trouvé un rapport important ($p < 0,01$) entre les stratégies individuelles d'apprentissage et l'âge indiquant que les plus jeunes apprenants sont plutôt kinesthétiques et auditifs et les apprenants plus âgés sont plutôt visuels dans leur apprentissage. La corrélation entre les stratégies individuelles d'apprentissage, le sexe de l'apprenant (1 = mâle, 2 = femelles) et la performance académique était généralement négative mais peu conséquente à $p = 0,05$. Nous avons trouvé une forte corrélation négative ($r = -0,31$, $p = 0,01$) entre le sexe de l'apprenant et sa performance académique. L'étude a dégagé une influence importante du logement sur la performance de l'apprenant dans les langues à l'école. Les résultats des internats sont de beaucoup meilleurs en anglais et en kiswahili que ceux des externats. Les résultats de cette enquête confirment que les apprenants sont bien différents l'un de l'autre et ils perçoivent, traitent et retiennent chacune des informations de manière autonome et systématique. Afin de privilégier un apprentissage plus efficace, on doit aider les apprenants à identifier ces différences individuelles pour qu'ils puissent apprendre des informations nouvelles et plus difficiles en fonction de leurs stratégies personnelles. Pour les parents, les enseignants et les responsables de la politique éducative, ce résultat peut aider à diagnostiquer les faiblesses des apprenants, à créer un environnement plus approprié à l'apprentissage, à mettre en place des activités d'apprentissage et efficaces et adaptés aux caractéristiques des apprenants, tout en se méfiant des décisions et des actions qui peuvent freiner le progrès des apprenants.

MOTS-CLÉS : apprenant, stratégie d'apprentissage, modalité perceptuelle, performance académique.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Problem

In any given country, education is considered as a basic human right (Universal Declaration of Human Rights (1948) Article 26), as well as a basic need. One primary objective of education is to impart knowledge and skills that can promote both individual and national development. It is the avenue of training human resource so as to attain social, economic, and political development. Educated citizens can exploit limited natural resources more intelligently and in a more sustainable approach. Any form of development begins with education. Although this should be the case, many countries in Africa, including Kenya, are yet to attain universal education.

In Jomtien, Thailand in 1990, governments of the world signed the World Declaration on Education for all and adopted the “Framework of Action: Meeting Basic Learning Needs for all”. By signing the Declaration, the 1500 delegates representing member states committed themselves to give priority to basic education and fight against illiteracy. Presently, over 180 countries have embraced and are domesticating the 1990 Jomtien Education for All (EFA) Declaration. Kenya was one of the signatories of the Declaration. The target areas as outlined in the “Framework of Action: Meeting Basic Learning Needs” are universal access to, and completion of primary (basic) education,

improvement in learning achievement, broadening the means and scope of basic education, and strengthening partnerships. During the Dakar 2000 World Education Forum, these countries presented their national EFA 2000 Assessments evaluating their progress in the provision of basic education for all. This points to the value that is attached to education.

The education system in Kenya aims at fostering national development, instilling individual competence, promoting national unity and creating international awareness. Those who go through formal education in Kenya are by the end of their training, expected to have the skills necessary for meaningful contribution to the economic development of Kenya as well as display improved quality of life. They will be more productive in their areas of employment not only because they are more skilled and knowledgeable, but also due to the fact that they can make sound decisions in relation to their health, nutrition and size of family.

A 1992 World Bank technical paper (No.165) puts gross enrollment ratio (GER) in Africa at an average of 75% at primary level of education and completion rate at 43%. Kenya, as at 1998, presents a success story with a high national primary school gross enrollment ratio (88.8%). Ironically, according to a 1997 report by the Institute of Policy Analysis and Research (IPAR) completion rate at primary school level has been on the decline, posting a mere 46%. These figures are much lower at secondary and higher educational levels.

Completion rate in Sub-Saharan Africa is said to vary substantially according to gender (fewer girls than boys complete primary and secondary levels of education), location (urban, 80%; rural, 35%) and still much lower in secondary level of schooling, declining more in rural areas (Khandker, Victor and Deon, 1994). This means that dropout rates are higher at secondary level of education and even higher in rural settings. The transition rates for girls were 39.4% in 1990 while boys' were 42.9% the same year. In 1998, girls' were 43.1% and boys' 46.4% (GoK, May 1999; GoK EFA Report, July 1992). Although there is a marked improvement, these figures are still below the 50% mark. High dropout rates in Kenya have been attributed to a number of factors including poor school performance, lack of interest in school, financial difficulty amongst others. With regard to cost, public schools are generally less expensive than private ones hence more accessible, therefore the issue of cost may be ruled out as a strong enough reason for increased dropout.

While some of the pupils who opt out of the educational system in Kenya may be victims of the examination elimination process, a good proportion voluntarily drop out as a result of the system's scholastic over-demanding disposition. Learners who repeatedly trail behind their counterparts are subjected to both social and academic stigma for being continually under-achievers and perhaps good-for-nothing. Cases have been reported where learners in many districts are

forced by their instructors to repeat a particular class several times in order to attain some set standard before they can proceed to the next class (CESA Draft Report May 2001). Such learners may end up leaving school having attained a very insignificant educational level. Perhaps this is one reason why in Kenya today, there is a very high enrollment rate in primary school (over 80%) and poor continuity to the successive levels; less than 50% to secondary level, and only 7% to university level (GoK EFA Report, July 1992). Primary education at the least serves as an eye opener as it offers basic cognitive skills such as literacy and numeracy. On the other hand, secondary education imparts complex cognitive skills like reasoning ability, problem solving and decision-making, and provides a bridge to higher education. It is in secondary school where higher order thinking skills are acquired. On average, the larger adult population in Kenya has attained only primary education. Yet it is only in secondary schools where higher cognitive knowledge and skills that are directly related to the future career (or current job market) are imparted (Khandker, Victor, Deon, 1994).

The disparities in enrollment and completion rates indicate that not all learners attain the much-desired success. Some learners are more successful than others. The Jomtien Conference recognized that in education, quantitative improvement alone is not enough. Attention must also be paid to improving the quality of basic education for all. Accordingly, one of the strategies towards EFA goals is improved learning performance, based on the attainment of defined levels of

performance. Indeed, Chinapah (1997) acknowledges that increased access and enrollment is meaningless if not accompanied by improvements in the nature and quality of education. According to him, an interplay of factors influence learning achievement: pupil characteristics and selected home background factors, the school setting and selected teaching/learning factors, and the community environment and selected school/community related factors. Agreeably, learners carry their personal characteristics into any learning process hence variation in learning achievement. These interact with school and community factors to influence learning performance. It is important to investigate on pupil's, school and community factors, why, of the many who enroll in primary schools, only a handful manage to reach and complete at least the secondary level of education. The researcher speculates that learner characteristics and selected home background factors are the foremost accompaniments in the learning process. For this reason, it is imperative to study important characteristics that learners bring into the learning process, that influence their interest in learning, and consequently, performance.

Extensive research has been going on about the learning process and how learners learn. Recent research evidence indicates that learners have unique learning style preferences that determine how much they learn and how well (Whitaker, 1995; Short, Stewin and McCann, 1991; Claxton, 1988, Dunn and Dunn, 1978; Tickton, 1970). It is possible to bombard a learner with new learning content but the

individual learner will determine the success of their learning. Moreover, how well they learn too will depend on how they prefer to learn it. This means that learners, in fact, play an active role in their learning for effective learning. This is only possible when each learner's preferred learning style has been carefully identified and thereafter information to be learned is presented in the way the individual learner prefers to learn. In Kenya, much research has been done on performances and factors affecting performances (Kibui, 1995; Mbuca, 1985); achievement motivation, locus of control, self-concept, academic aspirations (Oliwa, 1998; Mukonyi, 1987), learner's attitudes and interests (Maritim, 1984). Little research nonetheless, has explored the concept of learning styles. It is this gap in research that the present study intended to bridge by investigating the learning styles of pupils in public secondary schools with a view to establishing if there are significant differences in student performances by learning style preferences.

What children learn in school largely depends on what they already know. These schemas, usually acquired from parents, siblings, friends, church, books available at home or the media, are modified, extended or elaborated during the teaching-learning process. Children from the same culture, setting or school normally have more shared cognitive schemas because they may have been exposed to similar general experiences. Due to this reason, one District was selected for the study to minimise confounds as a result of culture. Bondo District is predominantly rural

and is dominated by one ethnic group, the Luo. According to the 2000 Siaya District Development Plan, the District has adequate infrastructure facilities and no private secondary schools. The area's population is largely youthful with 58.3% belonging to ages 0 to 19 (school age). The teacher-pupil (primary) ratio in the District (jointly considered with Siaya) is 1:18 compared to the burdensome national teacher-pupil (primary) ratio of 1:31 (GoK Education Statistics, 1999), yet pupils' performance in national examinations in this District is still low compared to other less endowed Districts.

1.2 Statement of the Problem

Individual learners have some potential that can be fully realised when they are aware of how best they learn and, consequently, take responsibility for their learning and as a result perform well. Learning style is an important personal characteristic, pertinent to learning that learners bring into the learning process. All learners can learn optimally and effectively when they know how to capitalise on their learning strengths. One way to identify learning strengths of any learner is to diagnose their preferred learning styles. It is possible to diagnose individual learner's style because learning style survey instruments have been developed, and are currently available worldwide.

It is therefore cardinal for learners to know their learning style preferences and where appropriate, make deliberate efforts to adopt learning styles that are not

only proven to result in high learning achievement, but also those which are concordant with the goals of their educational systems. Knowledge of each learner's preferred learning style may also help to modify one's approach to learning and hence improve the quality of their life by their own effort.

This study examined the awareness and use of differential perceptual learning style preferences by secondary school pupils in public schools of Bondo District. Pupils' preference for Auditory, Visual or Kinesthetic modalities was identified. Relationships among LSPs and sex of the pupil, age at last birthday, and academic achievement were investigated. Significant differences in the preferences were examined after controlling for home background factors of the learners (as covariates). Interaction effects between the residential status of each pupil and academic achievement by learning style were also assessed.

1.3.0 Objective of the Study

The main objective of the study was to examine awareness and use of varied perceptual learning style preferences by pupils in public secondary schools of Bondo District.

Specifically, the study sought to;

- Identify the perceptual learning style preferences of the pupils
- Establish the link between LSP and academic achievement, LSP and age, LSP and gender, and LSP and pupil's residential status at school.

1.4.0 Research Questions.

- 1.4.1 Do pupils in different public secondary schools in Bondo District have significantly different perceptual learning style preferences?
- 1.4.2 Is there a significant relationship between the perceptual learning style preference and academic achievement?
- 1.4.3 Is there a significant relationship between the identified learning style preference and gender of the pupil?
- 1.4.4 Are there significant interaction effects between the academic achievement of pupils by learning style preferences, and their residential status at school?

1.5 Significance of the study

Educators, parents, and policy-makers may be enlightened of the need to identify and accommodate differences in learning styles among individual learners, and

based on this knowledge plan learning environments and contents in a variety of ways in order to reach a large number of learners. Teachers may be educated on pupil characteristics that influence learning achievement and be wary of decisions and actions that hamper or enhance student progress. Learners may most actively and consciously make scholastic decisions that enhance their learning by focusing on their identified perceptual strengths especially when learning new and difficult academic information and skills

1.6 Scope and Limitation

Only Form Three pupils in public secondary schools of Bondo District were utilised. The study restricted itself to perceptual learning style and its link to learner's age, gender, and type of school. These were studied in relation to improving learning performance. A self-report learning style test where subjects ticked an appropriate response from three choices was used to reveal the learners' and teachers' preferred perceptual modalities. The 20-item learning style test is a modification of a 14-item online version adapted from Incentive Publications, Inc. Nashville, TN (1990).

1.7 Definition of Terms

Academic achievement: This refers to test scores of pupils in examinable school subjects. It was measured using normalized Mathematics, Kiswahili, English, Biology, Chemistry and Physics test scores of pupils in external (Joint Siaya-

Bondo District) examinations and where otherwise unavailable, scores in internal examinations were used as a substitute. Total points encompassed all eight examinable subject grade equivalents where A=12 points...E=1 point).

Co-educational school: A public school that admits a proportion of both girls and boys.

Constructivism: Educational theory stating that learners do more than absorb and store information. We make tentative interpretations of experience and go on to elaborate and test what we determine. Our mental structures are formed, elaborated, tested until we establish a satisfactory structure.

Learner: Any person, including an educator, who is actively engaged in the pursuit of knowledge and skill.

Learning style: Characteristic cognitive, affective, and physiological behaviours that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment.

Perceptual learning style preference: An aspect of learning style that describes how learners prefer to use their sense of sight, hearing, taste, smelling and feel, to interpret their daily learning experiences. Also known as perceptual modality,

they are biologically based reactions to the physical environment. They are classified as visual, auditory and kinesthetic/tactile as evaluated in the perceptual modality test.

Public school: A school that is fully or partially funded by the central government or communities and is managed through a Board of Governors (BOG) and Parents Teachers Association (PTA). The government employs teachers in public schools.

Pupil: A younger person who is taught in school by a more senior and authoritative instructor. Has a passive connotation. Has been used interchangeably with 'student' in the study for ease of reference. Otherwise 'student' should ordinarily refer to older learners in college or university.

Secondary school: This refers to the second cycle of 8+4+4 system of education practised in Kenya. It ranges from Forms One to Four. Only Form Three pupils are used in this study.

Sex segregated school: A secondary school that is either an all girls, or an all boys school.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter focuses on studies that are related to the present study while also tackling the theoretical and conceptual frameworks that guide it. A critical analysis of the literature reviewed has been provided, summarised and working hypotheses formulated.

2.2 General Learning

Learning generally is defined as a relatively permanent change in behaviour (or potential performance) due to practice or experience (Sternberg, 1998; Banks 1995; Gagne 1985, 1970; Deese, 1952). Changes resulting from drugs, maturation and illness are not classified as learning. Learning includes;

- a) good and bad habits
- b) observable behaviour, skills, and knowledge as well as the unobservable attitudes, thoughts, and feelings,
- c) both conscious and unconscious behaviours, and
- d) values and opinions.

As a process, learning is life-long and active. Learning begins from the womb and ends in the tomb.

Learning can be facilitated by informal, formal or non-formal education. Informal education is what one picks up in one's immediate environment, like a child learns new vocabulary; or gender roles, owing to daily life experiences. This kind of education is life-long and is relatively unorganised and unsystematic. Educative influences and resources in one's environment, be they family, neighbours, work or play, market place, library and the mass media are the principal agents of this kind of education. Contrastingly, formal education is

Hierarchically structured, chronologically graded 'educational system' running from primary school through the university and including, in addition to general academic studies, a variety of specialized programmes and institutions for fulltime technical and professional training (Coombs, with Prosser and Ahmed, Israel (Ed) 1973:10).

Formal education is represented by our 8-4-4 system of education. Non-formal education on the other hand, also known as out-of-school education, refers to any organised educational activity outside the established formal system.

2.3 Sensation and Perception for Learning

As soon as a person is born into this world, one begins to learn about oneself, other people, and the world in which one lives through the use of one's senses. Everyday of our lives, whether in or out of classroom, we receive through our senses, stimuli that we interpret in diverse ways depending on our genotype

(nature) and phenotype (nurture). Consequently, our thoughts, feelings, attitudes, actions and words are modified. Grusec (1990) notes that 90%, or more information about our environment is gained through sight. The sense of sight, and that of hearing form the major senses through which we receive sensory stimuli from our environment. These two can be used together with other senses of skin (touch, pain, heat or cold), smell and taste to infer properties of objects we perceive. This again supports the fact that learning begins with sensing (sensation), followed by the interpretation of what has been sensed (perception). If parents and others in a child's family provide the child with experiences that stimulates the child's senses, his/her attention, memory, and imagination develops and the child's aural and visual perceptions sharpened. Such skills and abilities are important to the child's further learning when the child enters school, as they constitute the child's schemas or prior knowledge. Consequently, learning that already began at home (informally) progresses in a school setting (formally).

2.4 How Pupils Learn

According to Bennett and Dunne (1994) what pupils learn in the classroom will largely depend on what they will have learnt by practice, by example and by reflection from daily life experiences. In daily life, pupils acquire ideas from books, television, talking to parents, friends or in religious settings like at church, mosques or temples. These ideas form what they already know and carry into school. These ideas or schemas are likely to be correct, incomplete or plain

wrong. They form the child's current ideas that they use to make sense of every day's experiences. The teacher's responsibility therefore is to find an effective way of modifying, extending or elaborating the child's cognitive schemas. In this way, learning can be defined as the 'extension, modification or elaboration of existing cognitive schemas' Bennett and Dunne (1994). Although pupils have different schemas, some schemas are shared. Pupils who come from the same religious setting, school or locality will have shared experiences in their local environment as well as from television or radio. Instructors offer knowledge in the form of telling, demonstrating and explaining, but it is the learner who makes sense of these inputs by constructing links with their prior knowledge. It is assumed that the construction of links is an active intellectual process involving the generation, checking and restructuring of ideas in the light of those already held (Bennett and Dunne (1994). Construction of meaning is a continuous process. This view of learning is often referred to as 'constructivist'.

2.5 School Learning

In an educational institution learning takes place through formal education. This entails imparting of knowledge, skills and attitudes through systematic instructional techniques in a school setting. However, even when undergoing formal education, what learners learn is not restricted to a school setting. Formal education may be introduced in school, but then a child continues discovering independently, other facts, knowledge, skills and attitudes as they interact with

other pupils in their environment. Following the 1948 Convention of the American Psychological Association, Bloom (1956; 1976) while formulating a classification of the goals of educational process identified three learning domains (domains of educational objectives) as follows;

- Cognitive domain includes those objectives that deal with the recall or recognition of knowledge and the development of intellectual abilities and skills.
- Affective domain includes objectives that describe changes in the development of interest, feeling, attitude and values, and the development of appreciations and adequate adjustment.
- Psychomotor domain includes those objectives that involve the development of skilled behaviour like typing, driving or swimming.

Of these three, cognitive domain is the main concern of schooling because its levels of behavioural complexity are pertinent to learning performance. The levels are; knowledge (remembering), comprehension (understanding), application (transferring), analysis (relating), synthesis (creating) and evaluation (decision-making) (Borich, Tombari 1997:397). In effective learning, learners manifest optimum standards of intellectual skills such as critical thinking, reasoning ability and problem solving. The other domains of affective and psychomotor are considered only when being linked to the cognitive outcomes. One stable way of assessing the outcome of school learning is by judging the

academic achievement of those who go through the educational system (Ausubel 1968).

2.6 An Overview of School Learning in Kenya

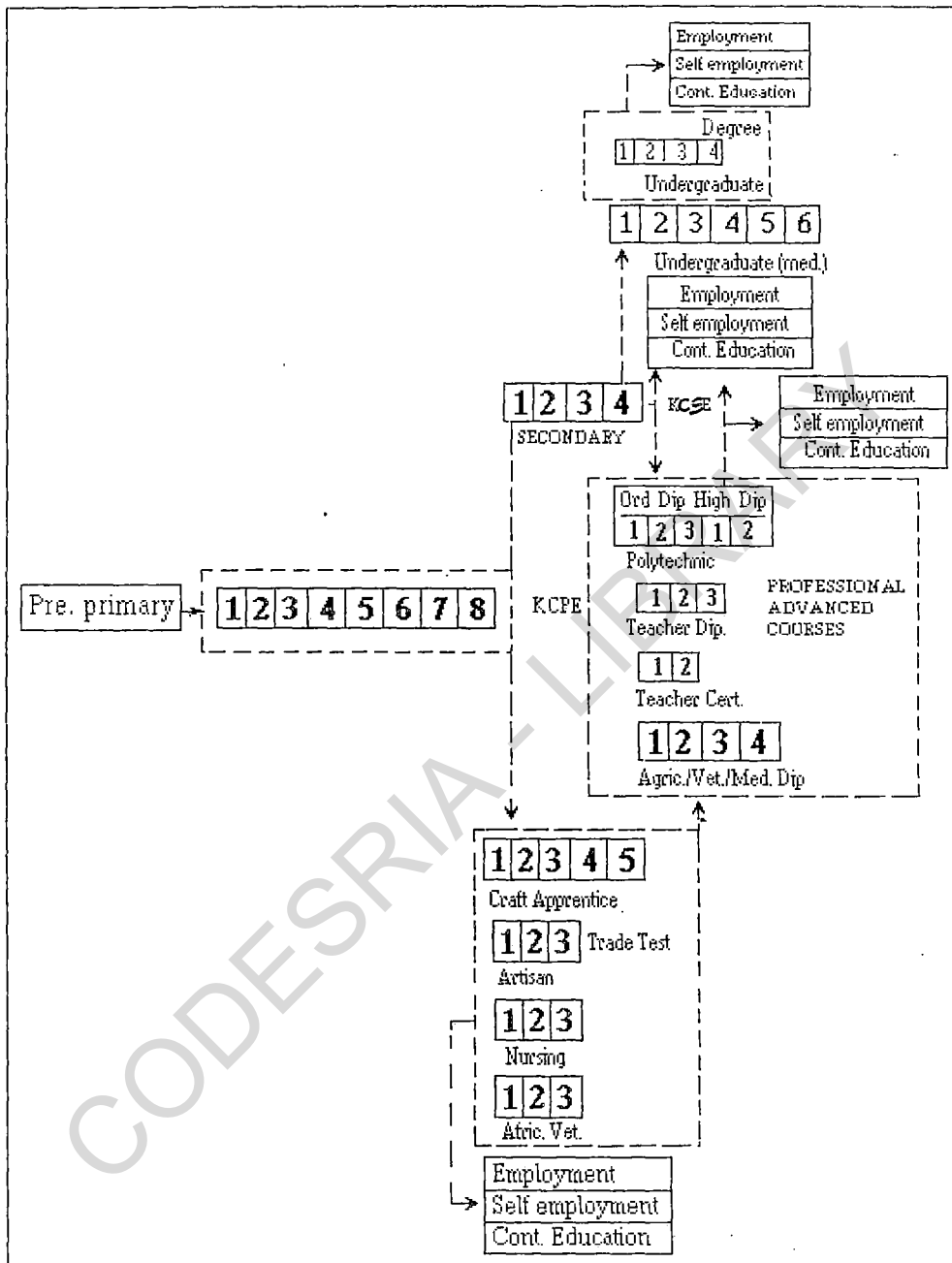
In Kenya, the educational system in place is 8+4+4: eight years in a primary school, four in a secondary school and a minimum of four years for a basic degree course (See figure 2.1). There are two major national examinations that determine a pupil's academic upward mobility, the Kenya Certificate of Primary Education (KCPE) and Kenya Certificate of Secondary Education (KCSE). KCPE is done after eight years of instruction in the primary level of education whereas KCSE is done after four years of instruction in the secondary level of education. Success at KCSE will determine if a pupil is to complete the cycle of 8+4+4 system of education by joining university for undergraduate courses for a minimum of four years, or pursue career related courses in other post-secondary tertiary institutions at certificate, diploma then higher national diploma level. While a small fraction of the learners proceed to the universities a large number drop out of the system even before completing secondary school.

According to 1998 education statistics (GoK, May 1999) GER at primary schools for both boys and girls were 88.8%, secondary level for both boys and girls, 23.2%; completion rate for primary education was 47.2%, secondary education,

84.5% whereas transition rate to secondary school for boys was 46.4%, and 43.1% for girls, and an average of 44.8% for both while transition to university was only 7%. These statistics show that of the pupils who enroll in primary schools in Kenya, over 50% do not proceed to secondary school while close to 16% of those enrolled in secondary schools do not complete the four-year cycle (Economic Survey 2000, 1999, 1998).

A number of the pupils drop out of school in upper primary after failing to attain marks required to enter secondary school while others choose to stay away from school when they cannot cope with the academic pressures at stake. These pupils may be those that have been termed 'slow achievers' or 'underachievers' by their teachers, parents and their high achieving siblings. Frustrated and feeling older, they find dropping out of the system a more appropriate alternative to dragging themselves along repeating one class severally in order to pass. These kinds of wastage evident in repetition concerns (CESA Draft Report, May 2001) is a signal that learning achievement is in jeopardy at all levels of education in Kenya, and strategies must be laid promptly to remedy the situation.

Figure 2.1: Structure of education system in Kenya



(Source: www.ibe.unesco.org/International/Databanks/Dossiers/mainfram.htm)

retrieved on September 12, 2001)

2.7 The Concept of Learning Styles

Many investigators across disciplines and countries have studied learning and the dynamics of the learning process. Their findings consistently report that each learner has unique ways of assimilating, analysing and processing information (Nixon, 1996; Sims and Sims 1995; Griggs, 1991; Dunn and Dunn, 1978). Learners have unique consistent cognitive, affective and physiological ways of responding to learning experiences. These ways otherwise called learning styles are well established by the time an individual becomes an adult (Short, Stewin, McCann, 1991).

The National Association of Secondary School Principals (NASSP) committee in the United States of America reached the consensus to define learning style as characteristic cognitive, affective, and physiological behaviours that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment (Sims and Sims, 1995). Cognitive styles are information processing habits of representing the learner's typical mode of perceiving, thinking, problem solving, and remembering. Affective styles refer to those motivational processes viewed as the learner's typical mode of arousing, directing, and sustaining behaviour. Physiological styles are biologically based

modes of response that are founded on sex-related differences, personal nutrition and health, and accustomed reactions to the physical environment.

Over the years, many authors have explored the concept of learning styles. During their careers as educators, Dunn and Dunn, (1978) first became involved with learning styles when they were assisting slow/under-achieving learners get to the optimum achievement levels. They gradually and consistently discovered that selected methods of learning activity packages often were highly effective with some youngsters who had originally not responded well to traditional teaching, but produced only minor gains in others. They used small group techniques and found out that certain children thrived while others avoided all peer-oriented studies. They also used programmed learning and games and discovered that the response rate of the learners were still varied with others picking up fast while others even totally refusing to be enticed into using games after initial experiences with them. At this point it became apparent to them that if they were to help pupils to become academically successful, they would have to develop different methods and then, in some way, determine which might appeal to and be effective with selected learners.

They embarked on research to establish this fact amongst pupils, teachers and parents. In one school, they interviewed every student, at least one parent of each, and every teacher to identify;

- i. topics that might be interesting or relevant to students in that school
- ii. topics that each student's parents believed their child would find interesting and
- iii. Topics that the students' teachers believed would be interesting to their classes based on the expressed concerns, experiences or talents.

Their finding revealed that of the three most relevant items indicated by the students, the teachers selected only one and the parents were incorrect on all three. They used these three identified topics as the focus of their relevant studies through which they planned to increase the students' reading levels, to design construct activity packages, short programmed learning sequences, stories and games. They again found out that regardless of the curriculum, it appeared to be the *methods* that were attracting youngsters. Furthermore, although a few preferred alternative methods at different times, or on different days, most students elected to use specific methods repeatedly once they had experienced success with them. This variety of responses caused them to examine the learner more closely.

Following these findings, they reviewed other educational and industrial literature on how children and adults learn and discovered evidence that each student does in fact, learn differently from their peers (Dunn and Dunn, 1978:4; Slavin, 1986; Dembo, 1994). They also confirmed that a learner's *immediate environment, own emotionality, sociological and physical needs* are clear sources of stimuli that affect how a learner learns. On the contrary, Dunn and Dunn's research was targeting the introduction of individualised learning. These authors are advocating the identification of pupils learning styles for the purpose of placement into special instructional programs based on their revealed preferences. In the Kenyan situation however, this is far from practicable. The cost of redesigning the instructional environment far outweighs its benefits. The government is still grappling with providing basic resources in public schools, whereas teachers have to make do with what is available. As for parents, the hard economic times with 47% of the population below the poverty line denies them the comfort of minding extra educational cares as they struggle to meet other daily basic needs of survival.

According to Dunn and Dunn (1978), there are four instructional programs currently in use in many educational systems of the world. These are traditional, individualised, open and alternative. In the Kenyan context, the instructional program in place is more comparable to the traditional one, characterised by the learner's lack of control of the curriculum content, pacing of study, resources and

schedule of the different curricular activities. Although pupils do not have control of the amount of sound, light, temperature, design, intake, and mobility and school structure; the element of their *immediate environment* in Dunn and Dunn's (1978) theory, they do and will always have control of how they interpret the different learning experiences they encounter (Bennett and Dunne (1994). In the other three programs, the learners have more flexibility on the curriculum, resources, schedule and pacing of learning.

2.8 The Perceptual Modality Preference

Like Dunn and Dunn (1978), Sims and Sims (1995) have listed a number of learning style dimensions that according to them, appear to have the most relevance to the improvement of learning achievement; conceptual tempo, conceptual level, locus of control, achievement motivation, social motivation, and perceptual modality preference. Of these they point out perceptual modality preference, a physiological way, as key above the rest. This is because it is the primary means of receiving (sensation) direct stimuli from any learning environment before it can be interpreted (perception). It is also the only **cognitive** learning style dimension that measures a learner's preferred reliance on one of the sensor modes (visual/spatial, auditory/verbal, psychomotor/kinesthetic) of understanding experience. The other dimensions of personality, sociological and instructional modalities depend on the sensory strength for in-coming information. Therefore, any misinterpretation by the sensory modality greatly

affects the kind of personality that is shaped, how one relates with others within the learning environment (sociological) as well as how one benefits from any given instructional program. In respect to this therefore, the researcher deems it fit to restrict herself to this dimension that learners have a direct influence on.

2.9 Identifying Learning Styles

Every learner brings into a learning situation some potential that can be fully exploited through knowledge and subsequent use of his/her preferred sensory/perceptual modality when learning new and difficult material. It is possible to identify the sensory modalities through which an individual learner best learns. Fruitful research efforts have today yielded instruments that have made this possible (for example Dunn and Dunn Learning Style Inventory, 1978). Teachers cannot identify styles accurately without an instrument. This is because some learner characteristics are not observable even to the experienced educators. Moreover, teachers often misinterpret student's behaviours and misunderstand their symptoms.

As has been discussed earlier on (See section 2.5), there are three learning domains namely; cognitive, affective and psychomotor. Learning style theorists have grouped learning styles into similar or related levels. For instance, Curry (in

Sims and Sims, 1995) outlines four dimensions of learning style in Curry's four-layer *onion* Model:

- a. Personality dimension assesses the influence of basic personality on preferred approaches to acquiring and integrating information (field independence, field dependence, introversion extraversion, sensing versus intuition, thinking versus feeling, judging versus perception).
- b. Information processing is the individuals preferred intellectual approach to assimilating information (includes cognitive styles, visual, auditory, tactile and kinesthetic perceptual modalities...)
- c. Social interaction addresses how students interact in the classroom: are they independent, dependent, collaborative, competitive, participant or avoidant?
- d. Multidimensional and instructional dimensions address an individual's preferred environment for learning.

The grouping and hence consideration of only one dimension as done in the present study is therefore not an isolated case. All these models stress the importance of identifying and addressing individual differences in the learning process. For more in-depth analysis, it is vital to examine an individual's learning style preferences under any of the four levels or dimensions.

In this study, an aspect of the physical source of stimuli (Dunn and Dunn, 1978), perceptual learning style preferences which determines how a learner interprets

learning material, an aspect that plays a key role in the learning achievement shall be explored in considerable detail. This is because it is the primary mode of receiving sensory stimuli from the environment before it can be interpreted in diverse ways.

2.10.0 Matching Learning Styles and Teaching Styles

2.10.1 Learning Styles and Academic Achievement

Research evidence indicates that matching teaching style with learning styles leads to higher academic achievement (Griggs, 1991; Claxton, 1988; Cohen, 1984), and that low achievers benefit the most from this kind of matching (Glewwe, Kremer, Moulin, Zitzewitz, 2000). In a research that involved one hundred and thirty-two female undergraduate students in the United States of America, Cohen (1984) hypothesized that students would learn more when the method of instruction was matched to the student's learning preference. In the first half of the experiment, the students were asked to state their preferences, and in the second part they received their preferred method of instruction. In this study, it was found that students who preferred competition had better initial knowledge of the material and learnt more during the learning experience than those who preferred co-operation and peer-tutoring. However, these findings may not be generalised of our secondary school pupils in Kenya; they would hold more water if an actual study in Kenya confirmed them. In addition, the research

was based on females-only subjects in a bid to avoid sex roles confound. Other social and cultural factors inherent in the study also jeopardize its external validity to the Kenyan experience.

Nixon (1996) reinforces Cohen's findings by asserting that when learners are taught by the ways they best prefer to learn, their active participation in their own learning is almost assured, and this does more to awaken their imagination. Therefore, teachers ought to identify pupil's learning style preferences. This should not be construed to imply that learners be strictly taught through the methods that they prefer to learn. Claxton (1988) particularly points out that information about style is useful in helping instructors become more sensitive to the differences students bring to the classroom and serve as a guide in designing learning experiences that match or mismatch students' styles, depending on the teacher's purpose and the learner's academic standing. Nevertheless, he is of the opinion that matching is only appropriate in working with poorly prepared students and with new students (college or secondary) where the most attrition occurs. Paradoxically, Claxton (1988) posits that sometimes some mismatching may be appropriate so that students' experiences help them to learn in new ways and to bring into play ways of thinking and aspects of the self not previously developed. He however, cautions that any mismatching should be done with sensitivity and consideration for the learner who may have taken some time to adapt to the current style. In the Kenyan situation where performance in national

examinations has continued to dwindle, teachers can choose to understand their pupils better by identifying their learning styles. This knowledge can then be used to diagnose the learning needs of poor learners or even place them in remedial groups.

In Kenya, a World Bank study (Glewwe, Kremer, Moulin, Zitzewitz, 2000) had predicted that supplementing textbooks with visual aids would promote learning in different subjects and therefore improve academic achievement. The study revealed significant findings especially for the low-achieving learners. A sample of 178 primary schools in Busia and Teso districts was used; 89 schools received five sets of flip charts in key subjects from a philanthropic organization. Findings revealed that there were no significant differences in the performance of the flip chart schools and comparison schools. However, during in-depth interviews with teachers who used flip charts, 30% who formed the majority, noted that flip charts helped the worst students most and improved their performance. The authors suspect that flip charts raised test scores by improving pupil's general interest in school and thus raising attendance, or they could lower scores by diverting pupil's or teacher's attention from non-flip chart subjects. Sims and Sims (1995) assert that by the time we reach adulthood, each of us have developed our own consistent methods of learning. This implies that adult learners have a unique and well-established style.

2.10.2 Learning Styles and Home Background

Marshall (1984) argues that home experiences that a child has formerly had are carried into the classroom with the child. Bennett and Dunne (1994), Dunn and Dunn (1978) generally support these sentiments. In the course of school learning, the child will make sense of the teacher's inputs of telling, demonstrating and explaining by constructing links with their prior knowledge. This implies that the sensory experiences that children are often exposed to at home through visits to the zoos, play material (toys), sibling games, parental and sibling talks, reading material, television, video or computer, will determine the quality of schemas that children carry into school and thus affect their learning. This prompted the researcher to speculate a relationship between preferences for one perceptual modality, and home-background.

2.10.3 Learning Style and Age

In a local study Oliwa (1998) studied the relationship between achievement motivation, locus of control and academic performance of class eight pupils in Bondo District. She found out that of the variables that were studied, only age had a significant relationship with the learner's academic performance at 99% confidence level. All the other variables of gender, family size, parent's education level and parent's occupation showed low correlation with academic performance.

On the other hand, Sims and Sims (1995) argue that at adulthood human beings have established consistent methods of learning. This finding poses a challenge for educators who must advise slow learners to adapt to new learning styles in order to raise their academic performance after identifying their learning styles. Short, Stewin and McCann (1991) have documented that some characteristics of learning styles are relatively stable while others change as a result of maturational stages, exposure to different instructional strategies and the learning environment. They propose that the younger the child, the more tactual and kinesthetic the child tends to be, and that majority of students move from being mostly tactual and kinesthetic learners to being visual learners. It would be interesting to test these premises in a hypothesis in the present study.

2.10.4 Learning Style and Gender

Although majority of the researches reviewed do not seem to show forthright where the differences by gender come in, it may be useful to establish this fact. Eggen and Kauchak (1992) have reported that gender is a contributing factor to individuality. They have documented that boys do better in Mathematics (beginning in teenage years) while girls are better in verbal skills, and that boys do better on visual and spatial tasks. In light of these arguments, it is imperative to investigate the relationship between the identified perceptual learning style preference and gender. The fact that Cohen's study (1984) was based on females-only subjects in order to avoid sex roles confound raises the question as to whether

the findings could have been different had gender been a variable. It may thus be interesting to find out if there is a relationship between learning style and gender.

2.10.5 Learning Style and Type of School

Pupils bring into any learning situation schemas that are differentially complete or correct, some of which are shared (Bennett and Dunne, 1994). Children from the same school type and setting will have more shared experiences and hence schemas, than those from a dissimilar school type.

In Kenya, public schools are divided into National, Provincial and District (CESA Draft Report May 2001). Pupils are selected into any of these schools according to their performance in the Kenya Certificate of Primary Education examination. It follows then, that pupils in District schools are likely to be average pupils whereas those in National and Provincial schools are likely to be high ability pupils. These public schools may again be single-sex, co-educational, boarding or day. Pupils in boarding schools are confined to the school compound most of the time, usually with regimented school routines. On the other hand, those in day schools are confronted with other domestic roles and responsibility besides other leisurely activities that also compete for their attention. This may distract their concentration in schoolwork.

2.11 How Identification of Perceptual Learning Style Preference will affect Learning

The general feeling among learning style researchers is that it is indeed beneficial to identify a learner's learning style preference (Sims and Sims, 1995; Short, Stewin, McCann, 1991; Claxton, 1988; Dunn and Dunn, 1978; Noar, 1972). Knowledge of learning style may help the individual learner to increase his/her range of learning by developing a fully integrated range of learning styles. It may also broaden the instructor's awareness of learner preferences so as to stimulate student learning more effectively by suggesting learner opportunities that are congruent with the identified learning style instead of antagonistic to it. In addition, such knowledge enables a teacher to construct learning groups more effectively in the sense of more consciously choosing students to put with other students in learning groups or on a work activity. This knowledge can help people understand what they might learn from each other and make use of the skills available, amongst them, pupil-pupil relationships, pupil-instructor relationship and instructor-pupil relationship. Furthermore, students and instructors can refine and improve their understanding of learning and learning skills. For example, the ability to establish effectiveness criteria for one's self, ability to identify one's own learning needs, ability to take advantage of learning opportunities, ability to share information with others, the ability to review what has been learned, and the ability to help others learn.

2.12 Summary of Literature Review

Following the literature reviewed above it can be concluded that learners have their own unique ways of concentrating on, assimilating/internalising, remembering, analysing and processing information. Learners also have unique consistent cognitive, affective and physiological ways or preferences of responding to learning experiences. These ways are well established by the time that they become adults.

It can also be concluded that perceptual modality preference is key in learning because it is the primary means of receiving direct stimuli from any learning environment. The other dimensions of locus of control, achievement motivation and social motivation are affective as well as emotive. Generally, the main concern of schooling is the cognitive domain (Bloom 1956; 1976, Ausubel 1968); affective and psychomotor domains are only considered in so far as they relate to the cognitive one.

The reviews have yielded facts to the effect that, each learner brings into the learning situation some schemas acquired from home background that helps them to construct meaning of the school learning experiences by linking prior knowledge with what the instructor is telling, demonstrating or explaining to them. Each learner also has some potential that may be fully exploited through

knowledge of the learner's preferred sensory modality and subsequent diagnosis of an appropriate alternative modality where weak academic performance is manifest. It is possible to identify the sensory modalities through which an individual learner best learns through a learning style inventory as opposed to teacher ratings. It is also documented that knowledge of learning styles leads to more effective learning and hence better academic achievement. Home background, age, culture, gender and type of school may influence learning style preference.

In addition to providing interesting findings that have formed the backbone of this study, the researches cited above have manifested several gaps. These gaps are ranging from the emphases placed on the research findings, for example instructional methods; re-designing of the instructional program; matching learning and teaching styles, to the population on which the findings were generalised, most of whom were college students and adults in the more developed Western nations. Most of the studies are also confined to the Western world, which may not be generalised in the Kenyan context.

A number of the studies reviewed too, for example Dunn and Dunn, (1978) have placed emphasis on resorting to individualised, open or alternative instructional programmes as opposed to the existent traditional programme. However, in the

sub-Saharan Africa where countries record poor economic growth, this is far from practicable. The cost of re-designing the classroom environment to complement students' diverse styles far outweighs its benefits. In Kenya, however, instructors and parents may find information about learning styles useful in diagnosing learning remedies for weak students.

Many of these studies were also done on multidimensional approaches like personality, information processing, social interaction and instructional dimension in a single study. This kind of theoretical triangulation introduces interpretation flaws in a study (Mwanje 2001) as some theories may present conflicting or incompatible propositions. Notable from the literature reviewed is the fact that considerable research done outside Kenya consistently pinpoint learning style as a crucial factor in the learning process. Nevertheless, local studies verifying and reinforcing this premise are minimal. It is this gap in learning-styles research that the researcher intended to fill as well as stimulate further research in this general area in Kenya and other African countries.

2.13 Theoretical Framework

The study is based on Dunn, and Dunn (1978) Learning Style Model. This Model traces its roots to two distinct theories:

- a) Cognitive Style Theory (based on the idea that individuals process information differentially on the basis of either learned or inherent traits) and,
- b) Brain Laterization Theory (based on the idea that the two hemispheres of the brain have different functions – left-brain is associated with verbal-sequential abilities; right-brain is associated with emotions and spatial holistic processing).

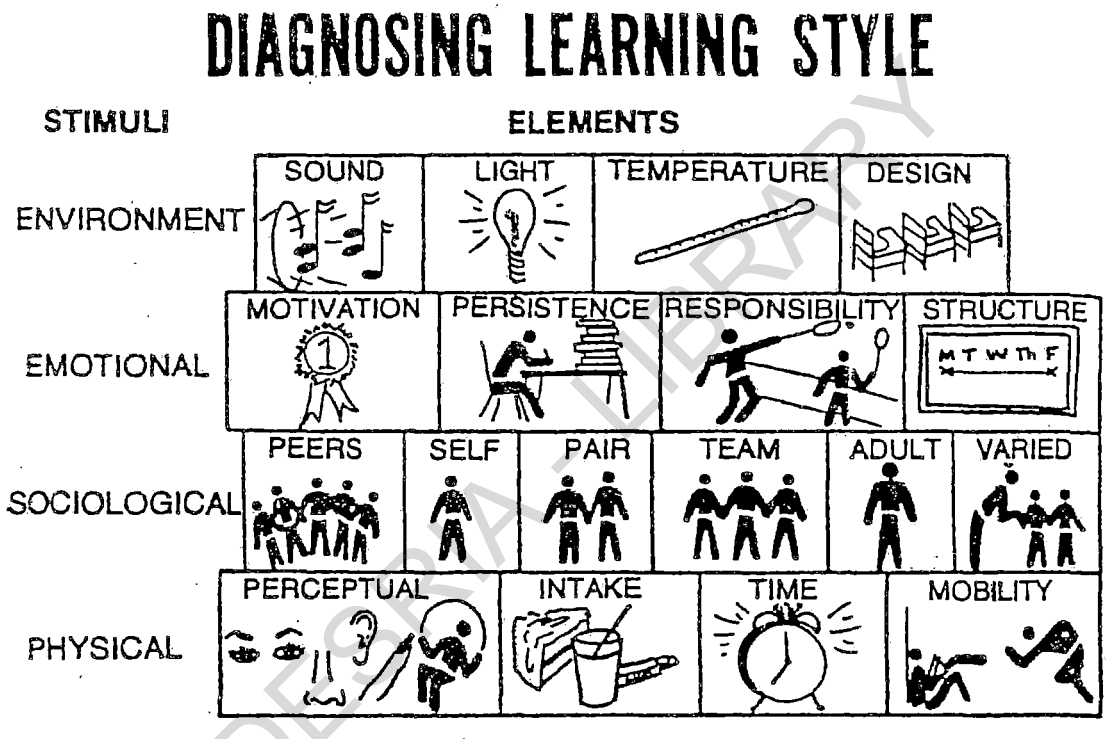
Dunn and Dunn suggest that individual learners do learn differently from each other and that student performances in different subject areas are related to how individuals do, in fact learn. They define learning styles as the way a person concentrates on, processes, internalises, and remembers new and difficult information or skills. These styles vary with age, achievement level, culture and gender. Dunn and Dunn argue that students can identify their own learning styles and that most people can learn anything when they know how to capitalise on their learning strengths. According to them, learners' preferences fall in the following five dimensions (See Fig.2.2: Dunn and Dunn's Learning Style Model) representing clear sources of stimuli that affect how an individual learns:

- i. **Immediate environment** (sound, light, temperature, and seating design)
- ii. **Emotionality** (motivation, persistence, responsibility/conformity, and need for internal or external structure)

- iii. **Sociological** (learning alone, in a pair, as part of a small group or team, with peers, or with an authoritative or collegial adult, also in a variety of ways in a consistent pattern)
- iv. **Physiological** (auditory, visual, tactual, and /or kinesthetic perceptual preferences; food or liquid intake needs; time-of-day energy levels; mobility needs)
- v. **Psychological processing preferences** (global or analytic processing inclinations assessed through correlation with sound, light, design, persistence, peer-orientation, and intake scores).

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Figure 2.2 Dunn and Dunn's Learning Style Model



Designed by Dr. Rita S. Dunn
Dr. Kenneth J. Dunn

(Source: Dunn and Dunn 1978:4)

2.14 Conceptual Framework

The perceptual modalities studied here are visual, auditory, and, tactile/kinesthetic preferences. They have been conceptualised as follows:

2.14.1 Visual preferences: Learners who prefer this modality can recall what has been read or observed. When asked information from printed or diagrammatic material, they often can close their eyes and visually recall what they have read or seen earlier. These pupils cannot tolerate movement or clutter. They prefer competitive working environments where they work individually under minimum supervision. They are very good at taking written tests and homework.

2.14.2 Auditory preferences: This perceptual modality describes people who can learn best when initially listening to a verbal instruction such as lecture, discussion or recording. They differentiate among sounds and can reproduce symbols, letters, and words by hearing them. These learners cannot tolerate noise. They learn through co-operative efforts in group discussions and peer tutoring. These pupils prefer close supervision and guidance.

2.14.3 **Kinesthetic/Tactile preferences:** These learners generally prefer to learn using varied real life experiences. They prefer to touch, feel, and manipulate things with their hands. They cannot sit for long and when idle, will move around manipulating items in their surroundings. They need closer supervision and structure.

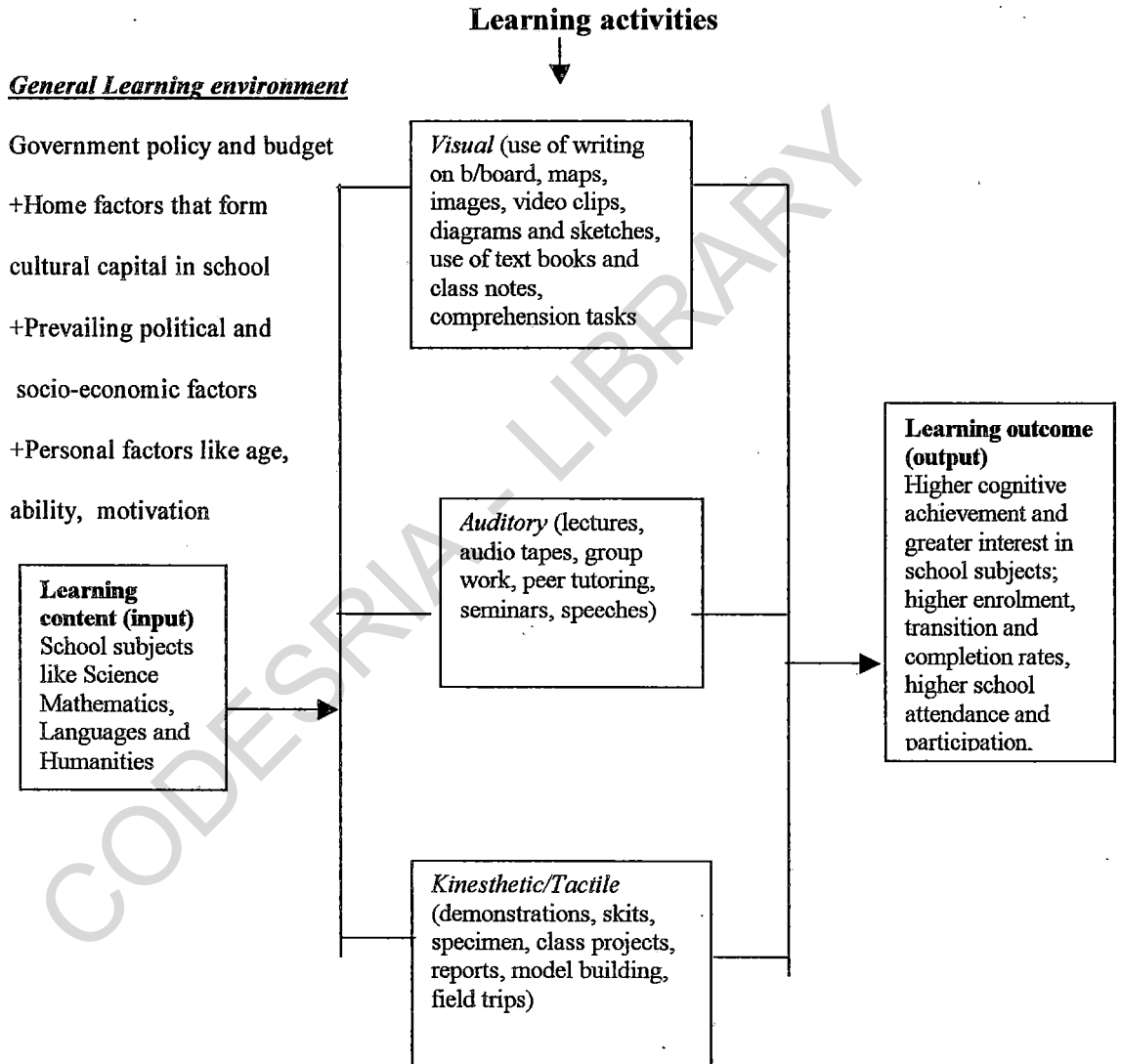
Although most learners do in fact learn through a combination of these styles, each learner has one prevalent modality. Slavin (1986) reckons that by providing appropriate levels of instruction, some student's differences can be accommodated. He states:

The existence of different learning styles is one reason that it makes sense to reinforce verbal presentation with visual cues such as writing on the chalkboard or showing pictures and diagrams to emphasise important concepts. Other differences in learning style can similarly be accommodated by varying classroom activities, such as active and quiet tasks or individual and group work (pp. 297)

When learning content is presented in a variety of ways visually (as in diagrams, charts), or through group discussions, drama, experiments or class projects, most of the learners are likely to benefit. This is because they will be active participants in the learning situation. Active participation in the learning process awakens imagination and arouses interest (Short, Stewin and McCann, 1991). The researcher proposes a model named *Integrated Approach Model of the*

Learning Process. Figure 2.3 represents conceptual framework for the improvement of learning process in secondary schools through this model:

Figure 2.3 *The integrated approach model of the learning process.*



(Source: researcher)

2.15 Research Hypotheses.

- 2.15.1 Pupils in different public secondary schools in Bondo District have significantly different perceptual learning style preferences.
- 2.15.2 Differences in learning style preferences remain significant after controlling for initial differences in age and home background.
- 2.15.3 There is a relationship between the perceptual learning style preferences and the pupil's academic achievement.
- 2.15.4 There is a relationship between the identified learning style preference and gender of the pupils.
- 2.15.5 There are interaction effects between the academic achievement of pupils by learning style preferences, and the residential status of the pupil.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents information about the research design, the population on whom the findings will be generalised, participants, instruments that were used in data collection, and concludes by discussing how the data collected was analysed.

3.2 Setting and Location

The study was carried out in Bondo District in Nyanza Province, Kenya. Bondo District records one of the highest enrollment rates in primary and secondary schools and one of the lowest completion rates at secondary school (Siaya District Development Plan, 2000). For example 61.9% of boys, and 38.1% of girls are enrolled in secondary schools in Bondo (2001 statistics), compared to a national GER of 24.6% for boys and 21.7% for girls (1998 statistics). Teacher-pupil ratio at secondary school is reported to be 1:16 in the District (Bondo District Development Plan, 2002-2008) as opposed to 1:29 national figure at the same level.

Some past researches conducted in the District (Grigorenko 2001) have cited chronic absenteeism among students as a major hindrance to educational progress

in the district. This location was selected also because of the researcher's familiarity with the culture of the community predominant in the area. Dunn and Dunn (1978) posit that learning styles also vary with culture. Generally, culture forms part of the schemas that a child brings into the learning process.

3.3 Research Design

The study took a correlational design. The researcher wanted to measure the extent to which perceptual learning style preferences of learners were related to their academic achievement, age, gender and residential status at school. This kind of design requires that the group under study be relatively homogeneous (Borg, 1984). To satisfy this key requirement, the researcher therefore restricted the population and sample to Form Three pupils in public secondary schools.

A Form Three class would be more appropriate for this kind of study because, having been in a secondary school system for the last two years, they have been exposed to the same school and setting longer and consequently have more shared learning experiences (schemas). They are also better adjusted and know their academic abilities and standing in relation to their classmates. Further, being a pre-candidate class, it is assumed that they have adopted regular study habits and learning patterns as they prepared for Kenya Certificate of Secondary Education (KCSE) examination to be done in less than two years time.

3.4 Population

The findings could be legitimately generalised on 24,346 pupils enrolled in 36 public secondary schools in Bondo District.

3.5 Sample

A sample of 10 schools out of 36 was randomly selected by simple random sampling. From these, 375 (175 Girls, 200 Boys) Form Threes in 8 public secondary schools in the District participated in the study. Two schools declined to take part, as they would not spare any more time, having lost time during the Teachers' Strike. To capture information on teaching styles, a sample of 36 teachers (27 male, 9 female) was used.

Table 3.0: Respondents by school

Name	Type of school	Total school enrolment	Frequency	Percent
1.Ramba	Boys boarding	504	51	13.6
2.Akoko	Mixed day/boarding	455	56	14.9
3.Maranda	Boys boarding	662	87	23.2
4.Nyamira	Girls boarding	304	52	13.9
5.Barkowino	Mixed day/boarding	150	24	6.4
6.Barchando	Girls day/boarding	162	41	10.9
7.Nyamonye	Girls boarding	373	43	11.5
8.Gobei	Mixed day	141	21	5.6
TOTAL		2751	375	100.0

Table 3.1: Respondents by gender

<i>Gender</i>	<i>Frequency</i>	<i>Percent</i>
Male	200	53.3
Female	175	46.7
Total	375	100.0

Table 3.2: Respondents by residential status at school

<i>Residential status</i>	<i>Frequency</i>	<i>Percent</i>
Boarding	316	84.3
Day	59	15.7
Total	375	100.0

3.6 Research Instruments

3.6.1 Learning Styles Test

A structured questionnaire containing two sections (See Appendix A) was used to extract information from pupil participants. A twenty-point objective Learning Style Test adapted from a fourteen-point on-line V.A.K. version (<http://alaike.lcc.hawaii.edu/lrc/ltest.html>) was used to score preferred perceptual modality into a three-point continuum in module 1. It contained 20 items with three (3) choices (visual, auditory and kinesthetic) for each item. Scores were computed based on the number of times each modality was chosen. Home background and personal data was extracted using another module 2 of the questionnaire constructed by the researcher and moderated by university

supervisors. Respondents were provided with open-ended options like 'other' only where there was a possibility of more answers. The questionnaire was group-administered. Factor analysis was done to establish whether the 17 variables sought measured the same dimension which could be referred to as 'student's home background'.

3.6.2 Teaching Styles Instrument

A Teaching Styles Questionnaire (structured) also constructed by the researcher was used to extract data on teaching styles. A 3-point Likert-type scale that included only statements that were clearly favourable to each teaching style was used. Respondents were given three choices of degrees of agreement thus; 'often', 'sometimes', and 'never', scored as 3, 2 and 1 respectively. A pilot study was conducted in the District to pre-test and adjust the instruments as deemed necessary. The sample used in the pilot study was not included in the final research.

3.6.3 In-depth interviews

Face to face in-depth interview schedules with 10 key informants were conducted to supplement information elicited in the questionnaires. The interviews followed a mixture of both structured and unstructured formats as can be seen in Appendix C. The interviews elicited information about individual schools, enrollment, and

personnel trends. Parents reported on home background and possible learning experiences they may have exposed their children to among other information they deemed relevant. Responses were analyzed alongside the information provided by teachers and learners.

3.6.4 Focus Group Discussions

Only one Focus Group Discussion for students was moderated by the researcher as a research assistant recorded. The original plan was to conduct 6 FGDs; 2 for teachers and 4 for pupils but after just one FGD, it was evident from the range of responses that analysis and interpretation of the data would be tricky. In any case, several valuers of the research had earlier on raised concern about the suitability of methodological triangulation in a correlation study. The use of this instrument was hence discontinued. The FGD was conducted just before the Strike began. After the Strike, a number of heads of schools were concerned about time and would not allow non-timetabled activities to eat up their time.

3.6.5 Scores in School Examinations

During data collection, it was established that the Joint Siaya-Bondo Mock Examinations that was to provide academic achievement measures had been banned and was no longer administered. Other Joint Siaya-Bondo Exams were privately arranged by individual subject teachers (Mathematics, English, Biology,

Physics and Chemistry) but were not official. Moreover, not all the 36 schools did the exams for varied reasons. Alternative test scores were therefore requested from individual schools. Preliminary analysis revealed outlier scores and abnormally large ranges. There was reason to believe that the deviation from normality may have resulted from defects inherent in the tests rather than from characteristics of the sample or from other factors affecting achievement (Anastasi, 1988). Raw scores were therefore linearly transformed to z (standard) scores then normalized for easy comparability by converting the standard scores into T-scores.

The main reason for normalization was to render them comparable on the same metric scale. The normalisation proceeded thus:

$$\text{Step 1: } z = \{X - M\} / SD$$

Where X - score,

M - Mean

SD - Standard Deviation.

$$\text{Step 2: } T \text{ score} = 10z + 50$$

Where z is a standard score

These transformed scores were the ones used in subsequent analysis for academic

3.7 Internal Validity

The following factors not in the interest of the researcher, risked jeopardising the internal validity of the study and were therefore controlled for as explained:

a) Location

Only Bondo district was chosen as the location and setting of the study.

b) Testing and Instrumentation

A pilot study was conducted to adjust the instruments appropriately. The questionnaire was pretested for workability, relevance and phrasing of questions. Some ambiguous questions were dropped and others in the original Perceptual Modality Test re-worded.

Data collection was interrupted by the National Teachers' Strike. Data collection was therefore done in two phases; before the strike, and a month after the strike. Each school was exhaustively covered either before or after the strike and no group questionnaires were administered to half the number expected at different times.

c) Subject characteristics

Other moderator/control independent variables of age and home background factors were included in the final data analysis as covariates.

d) History

Only data from Form Three pupils were analysed.

3.8 Data Collection

Data was collected in two phases. Data was collected from 5 schools during the first phase. In the second phase (soon after the strike) data was collected from 3 schools. Two schools declined to take part citing pressure on time; the year was coming to a close yet syllabus coverage had been disrupted by the Teachers' Strike. In all, data collection lasted 3 weeks. The first week was used in locating the sampled schools and negotiating entry. Where required, appointments were scheduled. Primary data was collected during the second week and third week. This entailed administration of individual (Teaching Style) and group questionnaires, conducting interviews and moderating one FGD. The pre-tested questionnaire containing the Learning Style (Perceptual Modality) Test and Home background data was group-administered. The average pupil took approximately 50 minutes to respond to the questionnaire. Teaching Style Questionnaire was approximately 20 minutes long. The FGD took close to 1hour 30minutes while interview times varied with the interviewee. Local education officials were more generous with their time as opposed to school heads and deputies.

Data Entry and Analysis

Data collected was categorised and coded, then subjected to quantitative analysis using the Statistical Package for the Social Sciences (SPSS) version 11.0. One-way Analysis of Variance, Chi-square test, Partial and Bivariate correlations,

Independent samples t tests, Analysis of Covariance/Multiple Regression to establish significant differences, magnitude of relationships, and main and interaction effects respectively at an alpha of 0.05 were generated alongside descriptive statistics. Data file on Home background was reduced through factor analysis.

3.10 Variables

The *Dependent Variable* was normalized total points (academic performance) and scores in selected subjects in internal and Joint Siaya-Bondo District MOCK Examinations. *Research Independent Variables* were scores on Perceptual Learning Style Preferences Inventory, residential (school) status of pupil, age and gender. *Moderator/Control Independent Variables (covariate)* were home background factors.

3.11 Statistical Hypotheses:

Ho 1 There is no significant variability in learning style preferences among pupils in public secondary schools of Bondo District (Spearman's correlation, Chi-square Test).

Ho 2 There is no significant variability in learning style preferences among pupils in public secondary schools of Bondo after controlling for initial differences in age and home background (Factor analysis, Spearman's correlation/Multiple Regression).

Ho 3 There is no relationship between the perceptual learning style preferences and the pupil's academic achievement (Multiple Regression and Independent samples t test)

Ho 4 There is no relationship between the identified learning style preference and gender of the pupil (One Way Analysis of Variance/Independent samples t test/Spearman's correlation)

Ho 5 There are no interaction effects between the academic achievement of pupils by learning style preferences, and the residential status of the pupil (Analysis of Covariance, Multiple Regression analysis, Independent samples t test).

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter presents findings of this study as interpreted using both descriptive and inferential statistics.

4.1 Biographic data of the respondents

Table 4.0: Table of means and standard deviations

		<i>Age</i>	<i>Sex</i>	<i>Residential mode Home residence</i>	
N	Valid	369	375	375	374
	Missing	6	0	0	1
Mean		17.358	1.47	1.16	1.41
Std. Deviation		0.9315	0.500	0.365	0.492

The table of means and standard deviations (Table 4.0) indicates that the average Form Three student who participated in the study was about 17 years old and lived in an urban centre (58.9%). The majority (84.3%) were boarding in school and there were fewer female students (46.7%) than male ones.

4.1.1 Residential status

Only 59 pupils (15.7%) commuted to school. According to the Ministry of Education (GoK CESA Draft Report 2001), all National and Provincial schools are Boarding schools whereas all District schools are officially supposed to be

Day schools. However, to boost the academic performance of their students, a number of District schools offer boarding facilities initiated by the teachers in collaboration with parents and the communities. As a matter of fact, it is a school policy in Mixed Day and Boarding public secondary schools in Bondo District that while in Form Three, all day schooling students have to be resident in school. Furthermore, a number of interviewed representatives of district schools in the study were adamant that their schools were classified as Provincial even when the researcher had information from the District Education office classifying their schools as 'District'. Due to this reason, it proved tricky to classify schools as either 'Provincial' or 'District' as had originally been planned, in its place, residential status of students was used.

4.1.2 Age of the pupils

The mean age of the pupils was 17.36, median, 17.32 and mode, 17. Table 4.1 below presents further summary. Due to the nature of the distribution of age of the participants, it became useful to include age as a research independent variable rather than control for its initial differences. The sample appeared to be of the same cohort save for a few outliers.

Table 4.2: Parents' level of education

	<i>Education</i>	<i>Father</i>		<i>Mother</i>	
		Frequency	Percent	Frequency	Percent
Valid	University	82	21.9	24	6.4
	College	132	35.2	133	35.5
	Secondary	40	10.7	99	26.4
	Primary	43	11.5	63	16.8
	<i>(Deceased</i>	<i>61</i>	<i>16.3</i>	<i>31</i>	<i>8.3</i>)
	Total	358	95.5	350	93.3
	Missing	17	4.5	25	6.7
Total		375	100.0	375	100.0

4.1.4 Number of siblings and selected utilities at home

More than half (52.7%) of the participants (N=372, mode = 2, range = 11) had 2 sisters and below, while 47.3% of them had at least 3 sisters. On the contrary, 52.5% had at least 3 brothers (mode = 3, range = 13) indicating that the average household the participants hailed from generally had more male siblings than female ones. Almost all the participants (290 out of 367) admitted to having a bicycle at home while 77 did not have, whereas only 77 (N=367) came from families who owned a car.

4.1.5 Number of classes repeated

Number of classes repeated was one of the items found to be crucial in providing further information about the pupil's academic performance. As can be seen in Table 4.3, only 40% of the pupils reported to have never repeated a class. One pupil admitted to have rewound five classes at different times, while three had repeated four classes at different times. This may account for the outliers in the age range.

Table 4.3: Number of classes repeated

		<i>Frequency</i>	<i>Percent</i>
Valid	Nil	151	40.3
	Once	163	43.5
	Twice or more	58	152.5
	Total	372	99.2
	Missing	3	.8
Total		375	100.0

4.2 Students' Learning Style Preferences

Respondents reported learning style preferences on a scale of 20 (See Appendix A). Visual learning style recorded the highest mean, followed by Auditory and Kinesthetic. Table 4.4 gives a summary of the results.

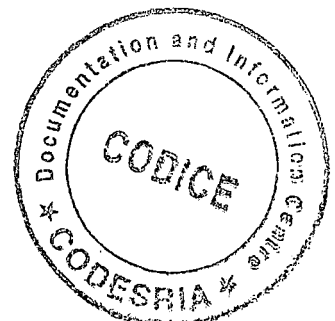


Table 4.4 Descriptive Statistics for LSPs (N=372)

	<i>Visual</i>	<i>Auditory</i>	<i>Kinesthetic</i>
Mean	10.14	5.13	4.67
Std. Deviation	2.292	1.883	1.871
Minimum	1	0	0
Maximum	19	12	12

Frequency distributions in Tables 4.5a, 4.5b and 4.5c indicate how, compared to Auditory and Kinesthetic, Visual is the most preferred learning style. Majority (94.4%) of the pupils scored 7 and above, indicating high preference for visual modality, while 20% of the students had high preference for Auditory and only 15.3% reported high preference for Kinesthetic Style. The frequencies were subjected to Chi-square analysis to test the hypothesis that the observed frequencies do not differ from their expected values. Looking at their residual columns, the observed number of pupils with scores between 8 and 13 for visual learning style is greater than expected. In addition, the observed number of pupils who scored between 3 and 7 in the auditory modality is equally greater than those expected while the observed number of pupils who were expected to score 7 in the kinesthetic modality was only exceeded by 1.

Table 4.5a: Frequency distribution for Visual learning style

	<i>Observed N</i>	<i>Expected N</i>	<i>Residual</i>
1	1	23.3	-22.3
4	1	23.3	-22.3
5	5	23.3	-18.3
6	11	23.3	-12.3
7	22	23.3	-1.3
8	40	23.3	16.8
9	68	23.3	44.8
10	61	23.3	37.8
11	71	23.3	47.8
12	41	23.3	17.8
13	30	23.3	6.8
14	11	23.3	-12.3
15	4	23.3	-19.3
16	2	23.3	-21.3
17	2	23.3	-21.3
19	2	23.3	-21.3
Total	372		

Table 4.5b: Frequency distribution for Auditory learning style

	<i>Observed N</i>	<i>Expected N</i>	<i>Residual</i>
0	1	28.6	-27.6
1	6	28.6	-22.6
2	19	28.6	-9.6
3	44	28.6	15.4
4	66	28.6	37.4
5	87	28.6	58.4
6	74	28.6	45.4
7	42	28.6	13.4
8	17	28.6	-11.6
9	6	28.6	-22.6
10	7	28.6	-21.6
11	2	28.6	-26.6
12	1	28.6	-27.6
Total	372		

Table 4.5c Frequency distribution for Kinesthetic learning style

	<i>Observed N</i>	<i>Expected N</i>	<i>Residual</i>
0	5	31.0	-26.0
1	14	31.0	-17.0
2	27	31.0	-4.0
3	47	31.0	16.0
4	69	31.0	38.0
5	100	31.0	69.0
6	53	31.0	22.0
7	32	31.0	1.0
8	19	31.0	-12.0
9	4	31.0	-27.0
10	1	31.0	-30.0
12	1	31.0	-30.0
Total	372		

Table 4.5d: Chi-square Test Statistics for the three learning styles

	<i>Visual</i>	<i>Auditory</i>	<i>Kinesthetic</i>
Chi-Square ^{a,b,c}	417.161	392.554	341.935
df	15	12	11
Asymp. Sig.	.000	.000	.000

a 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 23.3.

b 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 28.6.

c 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 31.0.

The Chi-square statistic obtained in Table 4.5d is significant at $p < 0.05$. This means that the obtained cell frequencies for the three learning style preferences are statistically different from their expected frequencies indicating variability in choices.

The Correlation Matrix in Table 4.6 displays Spearman's correlation coefficients. The strongest relationships are between Visual and Auditory learning styles ($r = -0.58$), and between Visual and Kinesthetic learning styles ($r = -0.53$). The correlation between Auditory and Kinesthetic Learning styles is relatively weak (r

= 0.30) though significant. These results indicate that there is a strong negative linear relationship among these learning styles significant at $p < 0.01$. In other words, an increase in Visual learning style corresponds to a decrease in Auditory learning style and a similar decrease in Kinesthetic learning style. Since the relationship among the learning styles is an inverse one, it can be concluded that high preference for Visual learning style implies a low preference for both Auditory and Kinesthetic learning styles. Therefore, there is significant variability in learning style preferences among secondary school pupils in Bondo District. H_0 1 predicting no significant variability in learning style preferences among pupils in Bondo district was therefore rejected.

4.2.1 Teaching Styles

Information provided by the teachers on their teaching styles showed a contrast to the pupils' learning style trends. Out of the 36 teachers who participated in the study, 28 (77.8%) were males while 7 were females. Generally, Bondo District like other schools in rural areas has more male compared to female teachers. During an interview with the District Personnel officer, it was revealed that many female teachers seek transfers to join their spouses in urban centres. The distribution of teachers in public secondary schools as at May 2002 in the five divisions is as shown in Table 4.7.

Table 4.6 Spearman's Correlation Matrix

<i>Learning Style</i>		<i>Visual</i>	<i>Auditory</i>	<i>Kinesthetic</i>	<i>Age</i>	<i>Sex</i>	<i>Total points</i>
Visual	Correlation	1.000					
	Coefficient						
	Sig. (2-tailed)	.					
	N	372					
Auditory	Correlation	-.580**	1.000				
	Coefficient						
	Sig. (2-tailed)	.000	.				
	N	372	372				
Kinesthetic	Correlation	-.530**	-.295**	1.000			
	Coefficient						
	Sig. (2-tailed)	.000	.000	.			
	N	372	372	372			
Age	Correlation	.141**	-.064	-.057	1.000		
	Coefficient						
	Sig. (2-tailed)	.007	.219	.276	.		
	N	366	366	366	369		
Sex	Correlation	-.014	-.040	.079	.045	1.000	
	Coefficient						
	Sig. (2-tailed)	.791	.443	.126	.387	.	
	N	372	372	372	369	375	
Total points	Correlation	-.056	.048	-.029	-.082	-.314**	1.000
	Coefficient						
	Sig. (2-tailed)	.277	.352	.583	.118	.000	.
	N	372	372	372	369	375	375

** Correlation is significant at 0.01 level (2-tailed).

Table 4.7: Distribution of teachers in Bondo's public secondary schools

<i>Division</i>	<i>Number of schools</i>	<i>Male</i>	<i>Female</i>
Maranda	7	78	20
Madiany	10	74	12
Nyang'oma	5	37	8
Rarieda	8	62	19
Usigu	6	49	23
Total	36	300	82

(Source: Bondo District Education Office, 2002)

Regarding teaching subjects, 37% of the teachers taught Mathematics and Science Subjects including Agriculture and Home Science while the rest taught Languages (mainly Kiswahili and English) and Humanities (History, Geography, Christian Religious Education and Social Education & Ethics). One teacher did not report on 'subjects taught'.

Table 4.8: Teaching subjects data

<i>Subject</i>	<i>Frequency</i>	<i>Valid Percent</i>
Languages	11	31.4
Mathematics	1	2.9
Sciences	12	34.3
Humanities	11	31.4
Total	35	100.0

Teachers rated their preferred teaching style on a 3-point Likert-type scale. Although Visual learning Style was reported to be the most preferred perceptual learning style by the pupils, results show that Auditory Teaching style appears to be the most preferred by the teachers (Mean=24.56, SD=2.69); Visual (Mean=23.00, SD=2.56) and Kinesthetic (Mean=22.25, SD=2.53). Relationships among teaching styles were tested using Pearson's correlation coefficient. Results indicate a strong positive relationship between Visual and Auditory Teaching Style ($r = 0.460$, $p=0.005$), which is significant at $p<0.01$. There is a strong positive relationship between Visual and Kinesthetic Teaching Styles ($r = 0.405$, $p=0.014$) significant at $p<0.05$ and an equally strong positive relationship between Auditory and Kinesthetic teaching styles ($r = 0.340$, $p=0.043$) significant at $p<0.05$. These results imply that an increase in the use of one teaching style is followed with an increase in the use of a second one. This was expected because teachers reported having no specific style but may use specific styles for different topics. These findings may not be conclusive because the sample was limited and not all subjects were represented.

4.3 Learning Style Preferences and Age

The correlation matrix in table 4.6 shows how age was positively correlated with visual learning style. This relationship, although weak ($r = 0.14$), is very significant at $p<0.01$, indicating that older pupils were more likely to use visual perceptual learning style than younger ones. In addition, age was negatively

correlated with auditory and kinesthetic perceptual learning styles indicating that younger students tended to be more auditory and kinesthetic oriented. However, the negative relationships among age and auditory, and kinesthetic modalities were not significant.

4.4 Learning Style Preferences and Home background

Seventeen variables defined home background. There was need for factor analysis to reduce this data file. KMO measure of sampling and Bartlett's Test of Sphericity in Table 4.9a showed significant relationships among the variables indicating that the data file on home background was suitable for factor analysis.

Table 4.9a: KMO and Bartlett's Test Statistics

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.734
Bartlett's Test of Sphericity	Approx. Chi-Square	890.073
	df	136
	Sig.	.000

Communalities extracted 9 variables each contributing >0.600 to the total variance. Variables with less than $.600$ were dropped in subsequent principal component analyses. Principal component analysis in Table 4.9b, extracted four components with Eigenvalues greater than 1. These components accounted for

68.5% of the total variance. The corresponding equamax-rotated (oblique) variance in Table 5.0 explained 21.8%, 19.2%, 15.5% and 12% of variance.

Table 4.9b: Principal Component Analysis (Total Variance Explained)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% Of Variance	Cumulative %	Total	% Of Variance	Cumulative %	Total	% Of Variance	Cumulative %
1	2.502	27.799	27.799	2.502	27.799	27.799	1.958	21.752	21.752
2	1.368	15.198	42.997	1.368	15.198	42.997	1.731	19.238	40.990
3	1.268	14.085	57.081	1.268	14.085	57.081	1.398	15.529	56.519
4	1.034	11.487	68.568	1.034	11.487	68.568	1.084	12.049	68.568
5	.846	9.398	77.966						
6	.616	6.843	84.810						
7	.572	6.354	91.163						
8	.415	4.612	95.776						
9	.380	4.224	100.000						

Extraction Method: Principal Component Analysis.

Table 4.9c: Unrotated Component Matrix^a

	Component			
	1	2	3	4
Family own TV	.759	.274	-5.498E-02	.225
Family own car	.649	7.536E-02	-.377	-.189
Mother's education	.632	-.418	.432	.134
Power at home	.605	-6.608E-02	-.399	.205
Father's education	.553	-.458	.514	.120
Family own p.c.	.511	5.793E-02	-.370	-.371
Family own bike	6.617E-02	.633	.522	-.111
Family own radio	.409	.603	.289	-.215
Number of sisters	-4.684E-02	.362	-.138	.823

Extraction Method: Principal Component Analysis.

a: 4 components extracted.

Table 4.9d: Rotated Component Matrix^a

	<i>Component</i>			
	1	2	3	4
Family own car	.767	9.609E-02	6.947E-02	-4.546E-02
Family own p.c.	.693	-1.351E-02	6.465E-02	-.232
Power at home	.654	.215	-.151	.274
Family own TV	.590	.334	.329	.369
Father's education	2.365E-02	.888	2.263E-02	-6.702E-02
Mother's education	.135	.871	2.860E-02	-2.340E-02
Family own bike	-.181	-1.095E-02	.809	3.773E-02
Family own radio	.238	5.528E-02	.775	-8.196E-03
Number of sisters	-7.249E-02	-.115	1.742E-02	.900

Extraction Method: Principal Component Analysis. Rotation Method: Equamax with Kaiser Normalization.

a: Rotation converged in 4 iterations.

Looking at the rotated component matrix in Table 4.9d, the first component is most highly correlated with utilities at home (car, personal computer, electricity and television). The second component is most highly correlated with parent's level of education. The third component is yet again highly correlated with more utilities found in the home (bicycle and radio) and the last component is highly correlated with the number of siblings, especially sisters. The resulting four components are thus, 'family own car', 'father's education', 'bicycle at home' and 'number of sisters' and may therefore be controlled for as 'home background'. Factor analysis was followed by Multiple Correlation Analysis to establish the strength of relationships and interactions. Results are presented in Tables 4.10a, 4.10b and 4.10c.

Table 4.10a Regression Model Summary for Learning Achievement

	<i>R</i>	<i>R Square</i>	<i>Adjusted R Square</i>	<i>Std. Error of the Estimate</i>
Model	Residential mode = boarding (Selected)			
1	.209 ^a	.044	.016	9.97821
2	.156 ^b	.024	.014	9.98858

Table 4.10b: ANOVA ^{c d} Summary

Model		<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
1	Regression	1258.563	8	157.320	1.580	.130
	Residual	27579.435	277	99.565		
	Total	28837.998	285			
2	Regression	702.395	3	234.132	2.347	.073
	Residual	28135.602	282	99.772		
	Total	28837.998	285			

a - Predictors: (Constant), family own bike, father's education, v. learning style, age of pupil, family own car, number of sisters, a. learning style, k. learning style

b - Predictors: (Constant), v. learning style, a. learning style, k. learning style

c - Dependent Variable: total points

d - Selecting only cases for which residential mode = boarding

When visual, auditory and kinesthetic learning styles, family own bike, father's education, age of pupil, family own car and number of sisters, were correlated with learning achievement of resident students, together these variables

contributed 4% (in Model 1, Table 4.10a) of the total variation in learning achievement (total points). But when the effect of age, family own car, father's education and number of sisters was removed (in Model 2, Table 4.10a), learning styles accounted for about 2.4% of the total variance in learning achievement although this contribution was not significant at p-level of 0.05. Although the relationship between learning style preferences, home background and academic achievement is positive ($r=0.209$), it is not significant ($p=0.130$) at $p<0.05$ (See Table 4.10b).

Table 4.10c: Table of Coefficients of the regression line^{a b}

Model		Unstandardized		Standardized	t	Sig.
		Coefficients		Coefficients		
		B	Std. Error	Beta		
1	(Constant)	37.021	20.780		1.782	.076
	V. Learning style	1.491	.873	.351	1.707	.089
	A. Learning style	2.073	.916	.397	2.262	.024
	K. Learning style	-1.835	.934	.346	1.964	.050
	Age of pupil	-1.152	.645	-.106	-1.788	.075
	Number of sisters	-.386	.378	-.061	-1.021	.308
	Father's education	.395	.424	.056	.930	.353
	Family own car	-.518	1.388	-.022	-.373	.709
	Family own bike	-.408	1.449	-.017	-.282	.779
2	(Constant)	15.759	17.511		.900	.369
	V. Learning style	1.465	.873	.345	1.678	.095
	A. Learning style	2.045	.917	.392	2.230	.027
	K. Learning style	1.896	.932	.358	2.036	.043

a - Dependent Variable: total points

b - Selecting only cases for which residential mode = boarding

The table of coefficients of the regression line indicates that auditory and kinesthetic learning styles contribute significantly to the total predictive value of all the other variables in Model 1, and remain significant in Model 2 when age and home background factors are controlled for. The finding here means that differences in learning style preferences remain significant when initial differences in age and home background are taken into account. Consequently, the second null hypothesis ($H_0 2$) predicting no significant variability in learning style preference after controlling for home background was therefore rejected.

4.5 Learning Style Preferences and Academic achievement

Relationships among perceptual learning styles and overall academic achievement were investigated using Multiple Regression/Correlation. Results are shown in Tables 4.11a, 4.11b and 4.11c.

Table 4.11a: Regression Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.045	.002	-.006	57.43641

Table 4.11a shows that there is a positive relationship among visual learning style; auditory learning style and kinesthetic learning style but this relationship is not significant.

Table 4.11b: ANOVA^{a b c} Summary

	Sum of Squares	df	Mean Square	F	Sig.
Regression	2502.088	3	834.029	.253	.859
Residual	1214010.202	368	3298.941		
Total	1216512.290	371			

a - Predictors: (Constant), k. learning style, a. learning style, v. learning style

b - Dependent Variable: total points

c - Weighted Least Squares Regression - Weighted by Total points

In Table 4.11b, the Sum of Squares Residual accounts for the larger part of variation in overall academic achievement as opposed to Regression, which means that perceptual learning styles do not explain the variation in overall achievement.

Table 4.11c Table of Coefficients^{ab}

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	39.323	24.686		1.593	.112
V. Learning style	.633	1.235	.149	.512	.609
A. Learning style	.762	1.265	.149	.603	.547
K. Learning style	.806	1.255	.155	.642	.521

a - Dependent Variable: total points

b - Weighted Least Squares Regression - Weighted by total points

Looking at Table 4.11c, none of the perceptual learning styles makes a significant contribution (at $p < 0.05$) to the Regression line. This is a pointer to the fact that there is no relationship between the perceptual learning style preference and the overall academic achievement of the pupil. In addition, the correlation matrix on Table 4.6 shows that those who reported preference for auditory learning style performed better than those who preferred Visual or Kinesthetic styles. Nevertheless these relationships are not significant at $p < 0.05$. Therefore, H_0 3 speculating no relationship between learning style preference and academic achievement was retained. A few questions may be raised here; did auditory learners display better performance purely by chance, or was it because of matched learning and teaching style? If you may recall, Auditory teaching style was the most preferred (Mean=24.56, SD=2.69) by teachers who participated in this study. It can therefore be concluded here that matching learning and teaching style leads to higher performance.

4.6 Learning Styles and Gender

Relationship between perceptual learning style and gender of the student was investigated using One Way Analysis of Variance; Independent samples T-test and Spearman's correlation coefficient. Sex of the student (1=male, 2=female) was slightly positively correlated with Kinesthetic style and slightly negatively correlated with visual and auditory styles, although these relationships are not significant (Refer to correlation matrix –Table 4.6). On the contrary, sex of the

participant was strongly correlated ($r = -0.31$) with overall performance. Female students performed poorly as compared to their male counterparts. This relationship was very significant at $p < 0.01$. Although the male and female groups tend to differ significantly in their performance as can be seen in Table 4.12, this difference cannot be attributed to their learning style preference.

Table 4.12: ANOVA Summary of Performance by Gender

		SUM OF SQUARES	DF	MEAN SQUARE	F	SIG.
TENG	Between Groups	1612.901	1	1612.901	16.807	.000
	Within Groups	35699.226	372	95.966		
	Total	37312.126	373			
TSWA	Between Groups	478.542	1	478.542	4.838	.028
	Within Groups	36898.015	373	98.922		
	Total	37376.557	374			
TMATHS	Between Groups	898.033	1	898.033	9.183	.003
	Within Groups	36085.723	369	97.793		
	Total	36983.756	370			
TBIO	Between Groups	5300.765	1	5300.765	62.034	.000
	Within Groups	30591.074	358	85.450		
	Total	35891.839	359			
TPHYC	Between Groups	596.727	1	596.727	6.257	.014
	Within Groups	10203.842	107	95.363		
	Total	10800.569	108			
TCHEM	Between Groups	2900.362	1	2900.362	31.516	.000
	Within Groups	32209.581	350	92.027		
	Total	35109.943	351			
TOTAL POINTS	Between Groups	3706.500	1	3706.500	41.057	.000
	Within Groups	33673.655	373	90.278		
	Total	37380.156	374			

Results of Independent samples T-test at Table 4.13a and 4.13b also reveal no significant relationship between gender and preferred learning style. There is no significant difference between girls' and boys' preferences of Visual ($t = -.372$), Auditory ($t = .827$) and Kinesthetic ($t = -.751$) learning styles and the means only differ marginally. The null hypothesis stating that there is no relationship between the identified learning style preference and gender of the pupil was thus retained.

Table 4.13a Group Statistics: Learning Styles by sex of pupil

<i>Learning style</i>	<i>Sex</i>	<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>Std. Error Mean</i>
Visual	Male	198	10.10	2.235	.159
	Female	174	10.19	2.361	.179
Auditory	Male	198	5.20	1.791	.127
	Female	174	5.04	1.984	.150
Kinesthetic	Male	198	4.60	1.876	.133
	Female	174	4.75	1.867	.142

Table 4.13b Independent Samples Test

Equal variances assumed

	<i>Levene's Test for Equality of Variances</i>		<i>t-test for Equality of Means</i>		Sig. (2-tailed)	Mean Difference	Std. Error	95% Confidence Interval of the Difference	
	F	Sig.	t	df				Lower	Upper
Visual	.341	.560	-.372	370	.710	-.09	.238	-.558	.380
Auditory	.279	.598	.827	370	.409	.16	.196	-.223	.547
Kinesthetic	.170	.680	-.751	370	.453	-.15	.195	-.529	.236

4.7 Interaction effects between the academic achievement of pupils by learning style and the type (residential mode) of public secondary school being attended.

When total points were considered, Multiple Regression Analysis revealed no significant interaction effects among academic achievement by learning styles and residential status of the pupil. However, when individual subjects were considered, there were a few significant interaction effects among specific subjects (especially languages), learning style and residential status of pupils as is presented in the subsequent sub-sections.

Table 4.14a: Multiple regression analysis Model Summary for Academic Achievement

R	R Square	Adjusted R Square	Std. Error Of The Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.102	.010	.000	10.00348	.010	.957	4	367	.431

Predictors: (Constant), residential mode, A., K., and V. L. styles ($r = .102$)

The above model summary shows that the relationship ($r = 0.102$) among residential status and, Visual, Auditory and Kinesthetic learning styles is not significant.

Table 4.14b: Regression ANOVA for Academic Achievement

	Sum of Squares	df	Mean Square	F	Sig.
Regression	383.013	4	95.753	.957	.431
Residual	36725.550	367	100.070		
Total	37108.563	371			

a - Predictors: (Constant), residential mode, a. learning style, k. learning style, v. learning style

b - Dependent Variable: total points

The higher residual sum of squares shows that the greater (99% i.e. $R^2=0.010$) part of variation in academic achievement among the group can be explained by factors other than the pupil's residential status or preferred learning style. This means that the interaction effect between the pupil's residential status and preferred learning style cannot significantly predict achievement.

4.7.1 Interaction effects among achievement in English, residential status and learning style

Table 4.15a: Regression ANOVA for Achievement in English

	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Regression	902.743	4	225.686	2.277	.061
Residual	36279.377	366	99.124		
Total	37182.120	370			

Predictors: (Constant), residential mode, A., K., V., Learning styles

This analysis shows that there are no significant interaction effects among residential status, preferred learning styles on English achievement, and that the positive relationship ($R=0.156$) among these variables is not significant. These variables account for only 2.4% ($R^2 = 0.024$) of the total variance in English achievement and this appears marginal, as it is not significant at $p < 0.05$

Table 4.15b: Regression Coefficients for English achievement

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
	B	Std. Error				Beta	Lower Bound
(Constant)	55.435	17.287		3.207	.001	21.441	89.429
V. L. style	-.317	.863	-.073	-.367	.714	-2.014	1.380
A. L. style	.158	.899	.030	.175	.861	-1.610	1.925
K. L. style	.155	.908	.029	.171	.864	-1.630	1.941
Residential mode	-3.282	1.419	-.120	-2.312	.021	-6.072	-.491

However, regression coefficients reveal that student's residential status alone, has a significant main effect ($t = -2.312$) on English achievement at $p < 0.05$ ($p = 0.021$).

4.7.2 Interaction effects among achievement in Kiswahili, residential status and learning style

Interaction effects among residential status, visual, auditory and kinesthetic learning style preferences (Table 4.16a) are significant at $p < 0.05$. These variables account for 9% of the total variance in Kiswahili achievement with main effects of residential status contributing significantly more to the total variance ($t = -5.340$, $p = 0.000$) than the other factors (Table 4.16b).

Table 4.16a: Multiple Regression Model Summary for Achievement in Kiswahili

<i>R</i>	<i>R Square</i>	<i>Adjusted R Square</i>	<i>Std. Error of the Estimate</i>	<i>Change in Statistics</i>	<i>R Square Change</i>	<i>F Change</i>	<i>df1</i>	<i>df2</i>	<i>Sig. F Change</i>
.299	.090	.080	9.60653	.090	9.031	4	367		.000

a - Predictors: (Constant),

Table 4.16b: Regression Coefficients for Kiswahili Achievement

	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>	<i>t</i>	<i>Sig.</i>	<i>95% Confidence Interval for B</i>	
	<i>B</i>	<i>Std. Error</i>	<i>Beta</i>			<i>Lower Bound</i>	<i>Upper Bound</i>
(Constant)	49.162	16.680		2.947	.003	16.362	81.962
V. L.style	.128	.833	.029	.153	.878	-1.510	1.765
A. L.style	.716	.867	.135	.826	.409	-.989	2.422
K. L.style	.917	.876	.171	1.047	.296	-.805	2.640
Res. mode	-7.311	1.369	-.267	-5.340	.000	-10.003	-4.619

Following the discovery of a link between performance in Languages and a pupil's residential status, there was need to find out if there was indeed a difference in performance between Day pupils and Residential ones. The two

groups of learners showed no differences in performances in all the other subjects except English and Kiswahili. Table 4.17a and 4.17b are summaries of the findings.

Table 4.17a: Group Statistics

	<i>Residential mode</i>	<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>Std. Error Mean</i>
TENG	Boarding	315	50.5018	10.26238	.57822
	Day	59	47.3292	8.03288	1.04579
TSWA	Boarding	316	51.1102	9.13417	.51384
	Day	59	44.0611	12.19427	1.58756

Table 4.17b: Independent Samples Test

		<i>Levene's Test for Equality of Variances</i>			<i>t-test for Equality of Means</i>						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
									Lower	Upper	
TENG	Equal variances assumed	6.121	.014	2.248	372	.025	3.1726	1.41116	.39777	5.94749	
	Equal variances not assumed			2.655	97.203	.009	3.1726	1.19500	.80095	5.54430	
TSWA	Equal variances assumed	13.714	.000	5.138	373	.000	7.0492	1.37196	4.35143	9.74693	
	Equal variances not assumed			4.224	70.646	.000	7.0492	1.66864	3.72171	10.37665	

4.7.3 Interaction effects among achievement in Mathematics, Residential status and Learning style

Table 4.18a: Model Summary for Achievement in Mathematics

<i>R</i>	<i>R Square</i>	<i>Adjusted R Square</i>	<i>Std. Error of the Change Statistics</i>		
			<i>Estimate</i>	<i>R Square Change</i>	<i>F Change</i>
.086	.007	-.004	10.00013	.007	.673

a - Predictors: (Constant), residential mode, A., K., and V. learning styles

Table 4.18b: Regression ANOVA for Achievement in Mathematics

	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Regression	269.007	4	67.252	.673	.611
Residual	36300.925	363	100.003		
Total	36569.932	367			

Predictors: (Constant), residential mode, A., K., and V. learning styles

The interaction effect among residential status, learning style preference and achievement in Mathematics is not significant at $p < 0.05$. In fact the positive relationship ($r = 0.086$) is not significant.

4.7.4 Interaction effects among achievement in Biology, residential status and learning style

There is no significant interaction effect among residential status, and learning style preference on Biology achievement do not interact to explain the variation in Biology achievement. Table 4.19a has the regression finding for Biology Achievement.

Table 4.19a: Regression ANOVA for Achievement in Biology

	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Regression	596.122	4	149.030	1.490	.205
Residual	35206.658	352	100.019		
Total	35802.780	356			

Predictors: (Constant), Residential mode, A., K., and V. learning styles

Although this is the case, residential status ($t = 2.000$, $p = 0.046$) main effects seem to contribute significantly to the 1.7% variance ($r = 0.129$, $R^2 = 0.017$) accounted for by these variables.

Table 4.19b: Regression Coefficients for Biology Achievement

	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>	<i>t</i>	<i>Sig.</i>	<i>95% Confidence Interval for B</i>	
	<i>B</i>	<i>Std. Error</i>	<i>Beta</i>			<i>Lower Bound</i>	<i>Upper Bound</i>
(Constant)	48.800	34.063		1.433	.153	-18.193	115.793
V. L. style	8.915E-03	1.707	.002	.005	.996	-3.349	3.367
A. L. style	-3.751E-02	1.735	-.007	-.022	.983	-3.450	3.375
K. L. style	-.454	1.717	-.085	-.264	.792	-3.832	2.924
Res. mode	2.909	1.454	.106	2.000	.046	.049	5.769

4.7.5 Interaction effects among achievement in Physics, Residential status and Learning style

Table 4.20: Multiple Regression Model Summary for Physics Achievement

<i>R</i>	<i>R Square</i>	<i>Adjusted R Square</i>	<i>Std. Error of the Estimate</i>	<i>Change in R Square of the Statistics</i>	<i>R Square Change</i>	<i>F Change</i>	<i>df1</i>	<i>df2</i>	<i>Sig. F Change</i>
.164	.027	-.011	10.01554	.027	.703	4	102		.591

Predictors: (Constant), residential mode, A., K., and V. learning styles

There are no significant interaction effects among residential status, learning style and achievement in Physics as the positive relationships among these variables are not significant at $p=0.05$.

4.7.6 Interaction effects among achievement in Chemistry, residential status and learning style

Table 4.21: Multiple Regression Model Summary for Chemistry achievement

<i>R</i>	<i>R Square</i>	<i>Adjusted R Square</i>	<i>Std. Error of the Estimate</i>	<i>Change in R Square</i>	<i>F Change</i>	<i>df1</i>	<i>df2</i>	<i>Sig. F Change</i>
.109	.012	.001	10.02386	.012	1.044	4	345	.384

Predictors: (Constant), residential mode, A., K., and V., learning styles

There are no significant interaction effects among residential status, learning style and achievement in Chemistry and the positive relationships among these variables are not significant at a p-level of 0.05.

4.8 Summary of Findings

At $p < 0.05$, the following are findings of the study:

1. There is significant variability in learning style preferences among pupils in public secondary schools in Bondo District.

2. There is significant variability in learning style preferences among pupils in public secondary schools in Bondo District, after controlling for initial differences in home background.
3. There is no significant relationship among perceptual learning style preferences, sex of the pupil, and the students' overall academic achievement. However, pupils who preferred auditory learning style generally performed better than those who preferred visual or kinesthetic. Auditory teaching style was the most preferred by the teachers.
4. There³ is a significant positive relationship between learning style preference and age of the student.
5. There are no significant interaction effects between academic achievement, perceptual learning style preference and the school residential status of the pupil. However, learners who are resident in school performed better in English and Kiswahili languages compared to those who are not.

CHAPTER FIVE

CONCLUSION

5.1 Introduction

This chapter revisits a summary of the study then discusses the findings and their implications on current educational practice. Recommendations and suggestions for future research are given at the end of the chapter.

5.2 SUMMARY

The objective of the study was to examine differential perceptual learning style preferences among Form Three pupils in Bondo District's public secondary schools. The study explored relationships among the identified learning style preferences and gender, age and overall academic performance. In addition, the study investigated the combined effect of perceptual learning style preferences and residential status of pupils on their overall academic performance.

A sample of 10 out of 36 public secondary schools was obtained by simple random sampling. A sample of 375 Form Three pupils from 8 schools participated in the study. Two schools did not participate as they sought to recover time lost during the Teachers' Strike. Pupils' perceptual Learning Style Preferences was measured using a Visual, Auditory and Kinesthetic learning style test. Information on the pupils' biographic data was elicited using a questionnaire constructed by the researcher. Academic performance was measured by the

pupils' scores on selected subjects (mainly compulsory ones) and sum total of points obtained in each of the eight examinable subjects. The researcher linearly transformed raw scores obtained from individual schools to render them comparable on the same metric scale. Face-to-face in-depth interviews were conducted with selected key informants, including education officers, persons (heads or deputy heads of schools) representing the schools and a few parents. One FGD was conducted among students.

Data obtained were summarized using descriptive statistics. Chi-square test statistic, Independent samples t tests, Spearman's correlation coefficients and Multiple Correlation/Regression were used to make inferences about the findings.

Findings revealed significant variability in students' preference for different learning styles. Negative relationships were found to exist among Visual, Auditory and Kinesthetic Learning styles. There was a significant positive relationship between visual perceptual style and age of the pupil. Interaction effects among learning style preferences by overall academic performance and residential status of pupils was not significant. However, main effect of the residential status significantly predicted achievement in English, Kiswahili and Biology. These findings may be generalised on 24,346 pupils enrolled in the 36 public secondary schools in Bondo District.

5.3 DISCUSSION

5.3.1 Pupils' Perceptual Learning Style Preferences

The present study found that learners do have different learning style preferences. While most of the pupils (94.4%) who participated in the study preferred Visual as their prime perceptual style and Auditory as the auxiliary style, only 20% of the participants used Auditory as the first preference, and a mere 15.3% recorded a first preference for Kinesthetic, learning styles. The research found a strong negative relationship among the three perceptual styles indicating that learners tended to prefer one style more often than others. This finding confirms previous research findings (Dunn and Dunn, 1978; Short, Stewin and McCann, 1991; Griggs, 1991; Sims and Sims, 1995) that although learners preferred alternative methods at different times or on different days, one method seemed dominant over the rest.

The strong negative relationship among the three perceptual styles indicates that although learners use a combination of the three styles, one style appears to be the most preferred. Although styles may vary according the task at hand, for instance, during a practical lesson most learners may use kinaesthetic modality, still one style is the most commonly used by the learner.

The reader will find the Learning Style Inventory provided in Appendix A useful in identifying learning styles. Related Inventories or tests may be found in resourceful Internet sites as is indicated in the reference list. To score this particular one, simply add up 'Vs', 'As' and 'Ks'. The highest score represents your dominant modality, second highest, auxiliary modality, and the lowest is your least preferred perceptual modality.

5.3.2 Learning Style and Academic Achievement

Correlations revealed no link between learning style preferences and overall academic performance. It is important to note here that previous studies (like Cohen, 1984) that had found a link between learning styles and academic achievement were experimental by design. The findings of this study imply that low or high academic performance is not necessarily affected by one's preference for Visual, Auditory or Kinesthetic learning styles. However, knowledge of one's preference may be crucial to both learners and teachers in identifying individual learner's strengths, and to understand ways in which styles concordant with a weak learner's preferences may be matched for more effective learning. In this study, students who preferred Auditory style to Visual or Kinesthetic style performed better than their counterparts. This is a pointer toward the benefit of matching learning and teaching style. Auditory teaching style was the most preferred by majority of the teachers. Studies that reported a relationship between

learning style and academic achievement first identified preferred styles then offered instructional materials in the ways the learner's preferred. Dunn and Dunn, 1978; Claxton, 1988, point out that this kind of matching worked better for weak learners. Indeed knowledge of a learner's learning style may help modify a learner's approach to learning by focusing on their learning strengths. Such knowledge is beneficial in lifelong learning.

5.3.3 Learning Styles and Gender

This study speculated a relationship between learning style preferences and gender; that girls would be more Auditory-oriented and boys more Visual and Kinesthetic-oriented. This was in light of the previous research finding, which had hinted that boys do better in Mathematics while girls do better in verbal skills, and that boys do better on visual and spatial tasks (Eggen and Kauchak, 1992). In addition, Cohen (1984) used females-only subjects supposedly to avoid confounds due to sex roles. In other words, gender is a contributing factor to individual differences. This study has found this to be true in relation to gender and academic performance. Sex of student (1=male, 2=female) was strongly negatively correlated ($r = -0.31$) with overall performance, significant at $p < 0.01$. Boys generally did better than girls in Mathematics and Science subjects whereas girls did well in Languages (English and Kiswahili). However, the study found no significant links between gender and learning style preference. It can thus be

concluded that although academic performances tend to differ by sex, there is no style substantively preferred by girls or boys only and that learning style preferences are not exclusively defined by sex of the pupil.

5.3.4 Learning Styles and Age

Age correlates positively with visual learning style. This relationship shows that older learners were more likely to use Visual Perceptual modality than younger ones. Age negatively correlates with Auditory and Kinesthetic modalities indicating that younger students tended to be more Auditory and Kinesthetic oriented. Again this finding is consistent with that of Dunn and Dunn (1978) and what Short and Stewin (1991) had observed. In effect, younger learners are more likely to benefit from activity-oriented learning as in building models, singing as opposed to older learners.

5.4 Issues raised but not discussed: Residential Status at School and Oral Proficiency.

In studying the combined effect of LSPs and residential status on academic achievement, this study found that in the predominantly rural Bondo, learners who were resident at school performed better in Languages especially Kiswahili, compared to those who were not. Could there be a link between residential status and verbalization? Are rural-born learners more likely to benefit from positive influences of their urban-born colleagues during the socialization process? These

are questions that arose from this finding but which could not be discussed exhaustively because it was an accidental finding that would have distracted the course of this study.

5.5 Implications of the Findings on Learning

5.5.1 Implications on Student Learning

These findings show that individual learners are different in the way they internalize, process and remember information. Students ought to know their learning styles so they can learn new and difficult material in the ways they best learn. This knowledge would be useful in identifying the learner's current weaknesses and diagnosing strategies concordant with his/her preferences. This kind of knowledge would be handy in advising weak learners to focus on their perceptual strengths when learning new and difficult material. Relationship between learning style and age shows that in teaching younger learners, singing, recitations and building models are better methods of learning whereas older learners can tolerate visual activities like writing and reading.

Generally, knowledge of an individual's learning style helps to modify the learner's approach to learning. Learning is a powerful tool in improving a learner's self-awareness and self esteem. Learning empowers learners to improve the quality of their life by their own effort. Knowledge of Learning Style

Preference is a powerful boost to this end because it motivates a learner to continue learning.

5.5.2 Implications on Teaching and Instruction

Educators ought to help learners identify their preferences and arrange/plan learning environments in diverse ways so as to cater for all learners. For instance, Kinesthetic learners prefer practical lessons where they can manipulate things with their hands. Such learners get bored in a long lecture-oriented class, and during their free times, they would rather be moving up and about. Because of the tendency to move around, they may earn names such as 'idlers' or occasionally be reprimanded for distraction.

Educators should know that any punitive decisions regarding such learners or even the 'noisemakers' who are auditory-oriented only serves to hamper their learning and progress. Certain steps like grouping learners with similar preferences together during co-operative work may be more helpful to their learning. Visual preferents tend to enjoy competitive work because of their inclination to read ahead of the instructor, as opposed to auditory learners who prefer co-operative work. Once an educator has identified these personal factors in learners he/she should build on them rather than impose on the students new orientation, unless the proposed remedy is one that will set right a learners weaknesses. Nevertheless, it should be at the discretion of the professional

educator to diagnose learning weaknesses in his/her poor students and recommend appropriate approaches to learning. All in all, learners should generally be encouraged to maximise each other's learning strengths in occasional diverse group activity. This way, learners may single out their own, or acquire new and effective styles otherwise never explored before.

5.5.3 Implications on Educational Policy

Kenya being a signatory to the EFA Goals vowed to domesticate the ideals of the 1990 Jomtien Education for All (EFA) Declaration. One of the Declaration's target dimensions is improvement in learning achievement. The Kenya government has laid down strategies to improve learning achievement as spelt out in her EFA 2000 Assessment Report presented during the Dakar 2000 World Education Forum. Regrettably, all the strategies focus on the teacher. For instance, there is emphasis on teacher education at all levels-early childhood education, primary and secondary. Yet the learner, not the teacher, is the most important element in the three-fold (learner, instructor, content) learning process. Deliberate efforts should be made to design strategies that are directly related to the learner. Mandatory identification of a learner's perceptual learning style upon selection to a new educational institution would be one gigantic step towards improving learning achievement.

Educational policy should have the capacity to increase involvement in learning. A learner's involvement in own learning facilitates the development of higher order thinking skills. By identifying learning styles, a learner's active participation in learning is ensured. This way, learning style is one individual difference pertinent to learning. Learning environments and contents should therefore be responsive to the preferences of all learners, whether Visual, Auditory or Kinesthetic-oriented.

5.5.4 Implications on Parenting

Parents should know that their children are unique and have different learning style preferences. Due to this reason, the kind of physical, social, and emotional environment that they expose their children to forms the foundation of informal lessons on which the future formal learning experiences are bound to build on. The kind of play materials, family outings or family activities that they expose their children to, may be beneficial or just as good as nothing, depending on the learner's orientation. Parents should, with the help of educators, identify their children's preferences so that they can offer compatible learning experiences away from school. The environment plays a greater role in stimulating the perception of the learner because it provides the schemas that will be extended, added or modified in later life during formal learning.

5.6 Suggestions for Further Research

5.6.1 Future research on learning styles should focus on whether matching learning and teaching style does result in improved academic performance. This will form the basis for guiding learners on better learning methods.

5.6.2 The study generally focused on Form Three Pupils only, future research could explore the possibility of a cross-sectional study in order to draw conclusions about other ages regarding the link with learning styles and age more exhaustively.

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APPENDIXES

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APPENDIX A – PUPIL’S QUESTIONNAIRE

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APPENDIX A
PUPIL'S QUESTIONNAIRE

Name _____

School _____ Class _____

MODULE 1 LEARNING STYLE INVENTORY

This is not an examination. This questionnaire explores the different ways in which you prefer to learn. There are three methods: visual, auditory and kinesthetic. These are called learning styles. Although different, no style is superior to another. Just like we are unique, these styles vary among individuals. Most people learn through a mixture of all three styles, however, one seems dominant/preferable. We want you to provide us with information on how you learn best so we can understand you better. Tick the response that applies to your habits. Please answer ALL questions as honestly as possible.

1. If I have to learn to do something, I learn best when I:
(V) Watch someone show me how.
(A) Hear someone tell me how.
(K) Try to do it myself.
2. When I read, I often find that I:
(V) Visualize what I am reading in my mind's eye.
(A) Read out loud or hear the words inside my head.
(K) Fidget and try to "feel" the content.
3. When asked to give directions, I:
(V) See the actual places in my mind as I say them or prefer to draw them.
(A) Have no difficulty in giving them verbally.
(K) Have to point or move my body as I give them.
4. If I am unsure how to spell a word, I:
(V) Write it in order to determine if it looks right.
(A) Spell it aloud in order to determine if it sounds right.
(K) Write it in order to determine if it feels right.
5. When I write, I:
(V) Am concerned how neat and well spaced my letters and words appear.
(A) Often say the letters and words to myself
(K) Push hard on my pen or pencil and can feel the flow of the words or letters as I form them.

6. If I had to remember a list of items, I would remember it best if I:
 - (V) Wrote them down.
 - (A) Said them over and over to myself.
 - (K) Moved around and used my fingers to name each item.
7. I prefer teachers who:
 - (V) Use the board while they teach
 - (A) Talk with a lot of expression
 - (K) Use hands-on activities
8. When trying to concentrate, I have a difficult time when:
 - (V) There is a lot of clutter (a state of disorder, things lying about in disorder), or movement in the room.
 - (A) There is a lot of noise in the room
 - (K) I have o sit still for any length of time.
9. When solving a problem, I:
 - (V) Write or draw diagrams to see it.
 - (A) Talk myself through it.
 - (K) Use my entire body or move objects to help me think.
10. When given written instructions on how to build something, I:
 - (V) Read them silently and try to visualize how the parts will fit together.
 - (A) Read them out loud and talk to myself as I put the parts together.
 - (K) Try to put the parts together first and read later.
11. To keep occupied while waiting, I:
 - (V) Look around, stare, or read.
 - (A) Talk or listen to others.
 - (K) Walk around, manipulate things with my hands, or move/shake my feet as I sit.
12. If I had to verbally describe something to another person, I would:
 - (V) Be brief because I do not like to talk at length
 - (A) Go into great detail because I like to talk.
 - (K) Gesture and move around while talking.
13. If someone were verbally describing something to me, I would:
 - (V) Try to visualize what she was saying.
 - (A) Enjoy listening but want to interrupt and talk myself.
 - (K) Become bored if her description got too long and detailed.
14. When trying to recall names, I remember:
 - (V) Faces but forget names.

- (A) Names but forget faces.
- (K) The situation that I met the person other than the person's name or face.

15. When revising for examinations, I remember best If I:

- (V) Write summaries of my notes on flashcards.
- (A) Discuss possible questions with friend(s).
- (K) Rewrite my class notes to reinforce the material.

16. When taking tests, I can:

- (V) See the textbook page in my head.
- (A) Hear how the instructor illustrated the points.
- (K) Remember how it felt.

17. When reading a book, I:

- (V) Need a quiet place.
- (A) Need to use my index finger to track my place on the line.
- (K) Hate to sit at desk for long periods of time, so I take frequent study breaks.

18. If I were to attend lectures:

- (V) I have trouble following lectures
- (A) Writing has always been difficult for me.
- (K) I am very good at interpreting instructor's body language

19. In taking personal notes:

- (V) I scribble/draw pictures absent-mindedly on the margins of my notebook pages.
- (A) Pages with small prints or poor quality copies are difficult for me to read.
- (K) I find graphs and diagrams useful in clarifying concepts.

20. When with a group of friends I:

- (V) Do not always get the meaning of a joke the first time.
- (A) Like to hear and tell stories.
- (K) Enjoy 'hands on' games and activities.

V = _____ A = _____ K = _____

Please turn over

MODULE 2 BACKGROUND INFORMATION

Fill in the gaps and where instructed, tick the appropriate responses. Please be as honest as possible.

1. How old are you? ()
2. Are you: Girl? () Boy? ()
3. At school, what is your mode of residence:
Boarding ()
Day ()
4. When did your register in this residential mode?
In Form 1()
Form 2()
Form 3()
5. a) Where were you born?
Urban residence ()
Rural residence ()

b) Where were you brought up?
Urban residence ()
Rural residence ()

c) Outside school, (during the holidays) where do you reside?
Urban residence ()
Rural residence ()
6. How many siblings (sisters/brothers) excluding yourself do you have?
Sisters () Brothers ()
7. Who is responsible for your education (tick all that apply)
a) Father _____ Mother _____
b) Well-wishers/Good Samaritan
b) Church
c) Extended family
d) Government Bursary
8. At home, do you have access to : (Tick either Yes or No)
a) Running (tap) water Yes () No ()

- b) Electricity Yes () No ()
 c) Daily Newspapers Yes () No ()

9. Tick **all** the classes you have repeated in the past.

Standard 1 () 2() 3() 4() 5() 6() 7() 8()
 Form 1() Form 2() Form 3()

10. What was your position in class last term? (Tick only one response)

Top 5 () Top 10() Top 20()
 Bottom 5() Bottom 10() Bottom 20()

11. Estimate the number of textbooks you have at home (Tick one response that applies)

More than 100 ()
 50 to 100 ()
 25 to 49 ()
 10 to 24 ()
 0 to 9 ()
 None at all ()

12. What is your father's educational level? Tick one response that applies:

University ()
 Completed college ()
 Some college ()
 Completed secondary ()
 Some secondary ()
 Completed primary ()
 Less than primary ()
 Deceased (this choice is only applicable for orphans) ()

13. What is your father's **MAIN** occupation? Tick one response that applies:

Farmer ()
 Teacher ()
 Craftsman ()
 Doctor ()
 Lawyer ()
 Businessman ()
 Tailor ()
 Fisherman ()
 Politician ()
 Other _____ (specify)

14. What is your mother's educational level? Tick one response that applies:

University ()

- Completed college ()
 Some college ()
 Completed secondary ()
 Some secondary ()
 Completed primary ()
 Less than primary ()
 Deceased (this choice is only applicable for orphans) ()

15. What is your mother's **MAIN** occupation? Tick one response that applies:

- Farmer ()
 Teacher ()
 Housewife ()
 Craftswoman ()
 Doctor ()
 Lawyer ()
 Businesswoman ()
 Tailor ()
 Fishing ()
 Politician ()
 Other _____ (specify)

16. Does your family own...? (Tick all that apply)

- Business () Bicycle ()
 Television () Computer ()
 Radio () Car ()

17. Which co-curricular activities do you enjoy participating in? (Tick all that apply)

- Drama ()
 Reciting poems/mashairi ()
 Public speaking ()
 Athletics ()
 Basketball ()
 Football ()
 Netball ()
 Handball ()
 Science congress ()
 Fine art exhibitions ()
 Other(s) _____ (specify)

THE END!!!

Thank You!

APPENDIX B – TEACHER’S QUESTIONNAIRE

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APPENDIX B TEACHER'S QUESTIONNAIRE

TEACHING STYLES QUESTIONNAIRE

This is not an evaluation test. This questionnaire explores the different ways in which you prefer to teach. There are three styles: visual, auditory and kinesthetic. These are teaching styles. Although different, no style is superior to another. Just like we are unique, these styles vary among individuals. Most teachers use a mixture of all three styles; however, one seems preferable. Read each statement and select by ticking the appropriate response as it applies to you.

Visual Modality

- | | {3} | {2} | {1} |
|--|---------|-------------|---------|
| When teaching, | | | |
| I present information in a written language format | [often] | [sometimes] | [never] |
| I prefer to use the blackboard | [often] | [sometimes] | [never] |
| I refer students to textbook pages as I teach | [often] | [sometimes] | [never] |
| I give pupils my notes to copy from | [often] | [sometimes] | [never] |
| I summarise key points at the end of the lesson | [often] | [sometimes] | [never] |
| I draw illustrations/diagrams on the chalkboard | [often] | [sometimes] | [never] |
| I coin sentences and key phrases to aid understanding of the concepts learnt | [often] | [sometimes] | [never] |
| I translate word, ideas into symbols, pictures and diagrams | [often] | [sometimes] | [never] |
| I decide my students' sitting position | [often] | [sometimes] | [never] |
| I like solving crossword puzzles | [often] | [sometimes] | [never] |

Auditory Modality

- | | | | |
|---|---------|-------------|---------|
| When teaching, enjoy a lesson where pupils discuss amongst themselves | [often] | [sometimes] | [never] |
|---|---------|-------------|---------|

I teach/would love to teach from audio tape/radio lesson
[often] [sometimes] [never]

I teach best when interacting with my students in a listening/speaking exchange
[often] [sometimes] [never]

I encourage pupils to form study/discussion groups [often] [sometimes] [never]

When teaching technical information, I “talk my way” through the new information, stating the problem in my own words. [often] [sometimes] [never]

I encourage students to give me answers in their own words
[often] [sometimes] [never]

I find it useful for students to read out loud when reading a Textbook
[often] [sometimes] [never]

Noise distracts me from whatever I’m teaching [often] [sometimes] [never]

When giving important information, I say points over and over
[often] [sometimes] [never]

I talk with a lot of expression [often] [sometimes] [never]

Kinesthetic/Tactile Modality

When teaching,

I encourage bright students to sit at the front [often] [sometimes] [never]

I love to see pupils taking notes [often] [sometimes] [never]

I use class demonstrations and simulations [often] [sometimes] [never]

I advise pupils to work with their friends [often] [sometimes] [never]

I don’t mind pupils moving around as they solve problems
[often] [sometimes] [never]

I make models of key concepts [often] [sometimes] [never]

I love/would like to take pupils for field trips (museum, historical sites, industries)
[often] [sometimes] [never]

When reviewing new information, I find myself copying key points onto the chalkboard [often] [sometimes] [never]

I enjoy sports and sports competitions [often] [sometimes] [never]

I enjoy music and drama festivals [often] [sometimes] [never]

Put an 'x' to mean 'No' or a tick to mean 'Yes'

Are you Male [] Female []

You teach in

a) Provincial School [] District School [] (Tick all that apply)

b) Girls' School [] Boys' School [] Mixed School []

c) Boarding School [] Day School [] Mixed Day & Boarding []

Which subjects do you teach:

Thank You!

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APPENDIX C – CHECKLISTS



INTERVIEW AND FOCUSED GROUP DISCUSSION CHECKLISTS

DISTRICT EDUCATION OFFICER/ DISTRICT STAFFING OFFICER

Interview focused on the following:

- Number and list of Public and private schools
- Pupil enrollment in public schools (male and female)
- Distribution of teachers in public schools (male/female)
- School categorization as either District/Provincial/Day/Mixed
- Distribution of schools per Division
- Subjects Taught in schools
- Mock/Previous KCSE Results
- Any other information that may be offered

PRINCIPAL/DEPUTY PRINCIPAL'S INTERVIEW SCHEDULE

1. NAME OF SCHOOL _____
2. School classification

Provincial	a) Boarding
	b) Day
District	a) Boarding
	b) Day
Other	a) boarding
	b) Day
3. Student Population:

Girls	_____
Boys	_____
Total	_____
4. Teacher Population:

Male	_____
Female	_____
Total	_____
5. Which co-curricular activities do pupils in your school participate in **most** actively?
 - Music festivals
 - Drama
 - Sports-Football,
 - Basketball,
 - Net-ball,
 - Handball,
 - Athletics,
 - Cross-country
1. Recent Internal Examination Results?
2. Mock or Joint External Examination Results?

THANK YOU!

PARENT'S INTERVIEW SCHEDULE

Name of parent (optional) _____ Male/Female

Name of child _____ male/female

School _____

Type of School: Provincial _____ Boarding/Day

District _____ Boarding/Day

1. **How** do you rate your child academically?

Brilliant []

Very good []

Good []

Average/Satisfactory []

Low achieving/Poor/Weak []

2. Do you think your child enjoys schoolwork? Yes [] No []
I _____

3. While at home, what educational activities does your child engage in.

a. prefers to study with friends, sisters, or brothers []

b. reads a lot on her own []

c. Manipulates things with her/his hand likes drawing, building and constructing blocks [].

d. enjoys outings, trips to museum and travelling []

e. other _____

4. What is your child's favourite subject? _____ Why do you think
so _____

_____5. What is your child's most challenging subject? _____
Why? _____

6. Do you take your son/daughter on trips/speeches/drama/cinema?

Often []

Sometimes []

Always []
Rarely []

7. There are three different learning styles; Visual, Auditory and Kinesthetic. Most people use a mixture of all three, but one is dominant. What is your learning style?

8. What do you think is your daughter's/son's learning style?

9. What is your child's hobby?

Telling stories []
Singing []
Repairing goods in the house []
Sport []
Outings []
Reading storybooks []

10. Does your child attend school regularly?

Always []
Sometimes []
Often []
Rarely []

Thank You!!

FOCUS GROUP DISCUSSION – STUDENTS

School _____

Number of participants _____

Male _____ Female _____

Mean Age of participants _____

- 1) What makes a lesson interesting to you?
- 2) What are your most effective classes? Mention some of the activities in such a class.
- 3) What is your challenging subject? What makes it so?
- 4) Where in a classroom do you prefer to sit? Why?
- 5) How would you choose to do your class assignments? With a friend/friends, alone, taught by a friend or with the help of a teacher.
- 6) When studying for examinations, what do you do to help you understand the content you are reading?
- 7) Do you go for educational trips while at school? If so, which ones do you enjoy most?

Thank You!!

APPENDIX D – RESEARCH PERMIT

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grams: "EDUCATION", Nairobi

phone: Nairobi 334411

re replying please quote

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and date



JOGOO HOUSE "B"

HARAMBEE AVENUE

P.O. Box 30040

NAIROBI

13th September....., 20..02

Carolyn Onyango
Kenyatta University
P.O. BOX 43844
NAIROBI

Dear Madam

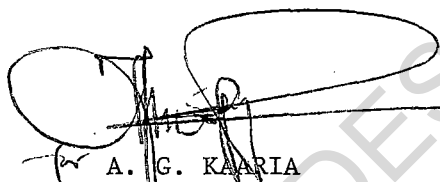
RE: RESEARCH AUTHORISATION

Following your application for authority to conduct research on 'Differential Receptional Learning Style preferences among pupils in selected Public Schools in Bondo District, I am pleased to inform you that you have been authorised to conduct research in Bondo District for a period ending 30th November, 2003.

You are advised to report to the District Commissioner Bondo and the District Education Officer, Bondo District before embarking on your research project.

You are further advised to avail two copies of your research report to this Office upon completion of your research project.

Yours faithfully


A. G. KAARIA
FOR: PERMANENT SECRETARY/EDUCATION

CC

The District Commissioner
Bondo District
P.O. BOX
BONDO

The District Education Officer
Bondo District
P.O. BOX
BONDO

PAGE 2

THIS IS TO CERTIFY THAT:

Prof./Dr./Mr./Mrs./Miss ONYANGO CAROLYNE

of (Address) KENYATTA UNIVERSITY

P.O. BOX 43844, NAIROBI

has been permitted to conduct research in

Location

BONDO

District

NYANZA

Province

on the topic DIFFERENTIAL RECEPTIONAL
LEARNING STYLE PREFERENCES AMONG
PUPILS IN SELECTED PUBLIC SCHOOLS IN
BONDO DISTRICT

for a period ending 30th November, 19 2003

PAGE 3

Research permit No. MOEST 13/001/32C/86

Date of issue 13th September, 2002

Fee received Shs. 500



[Signature]
Applicant's
Signature

For:

[Signature]
A.C. KAARIA
Permanent Secretary,
Office of the President
EDUCATION

CONDITIONS

1. You must report to the District Commissioner of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least four (4) bound copies of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.



REPUBLIC OF KENYA

RESEARCH CLEARANCE
PERMIT

OFFICE OF THE PRESIDENT

DISTRICT COMMISSIONER
BONDO

District Commissioner,
P.O. Box 236,
BONDO.

REF: BOND/ED/15/3.VOL.I/51

27th September, 2002

Carolyne Onyango,
Kenyatta University,
P.O. Box 43844,
NAIROBI.

RE: AUTHORITY TO CONDUCT RESEARCH

This is to grant you authority to conduct research on differential Receptional learning style preference among pupil's in selected public schools in Bondo District for a period ending 30th November, 2003.

DISTRICT COMMISSIONER
BONDO

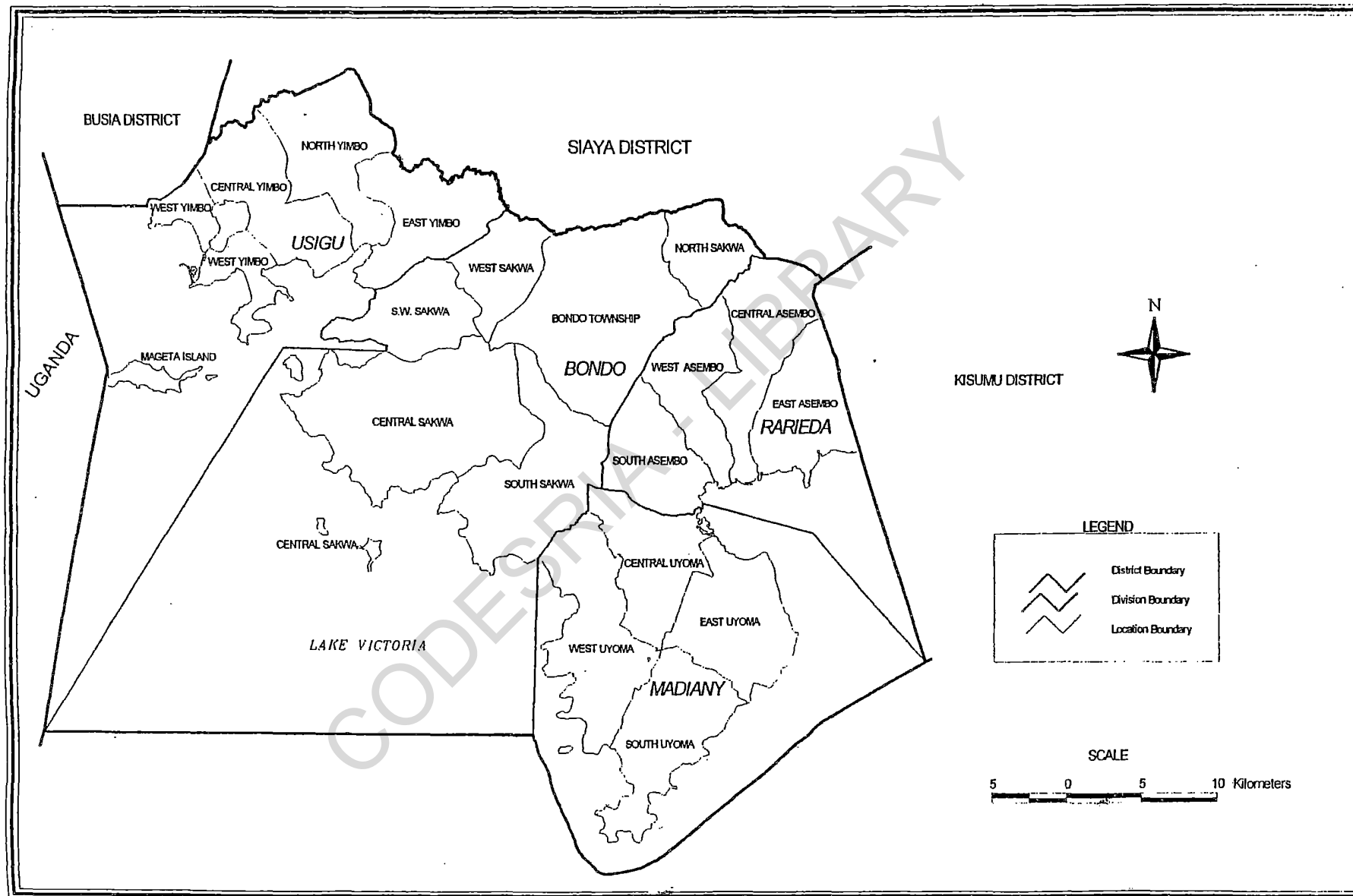
(E.K.A. TOO)
FOR: DISTRICT COMMISSIONER
BONDO DISTRICT

/Maa

APPENDIX E – LOCATION OF BONDO DISTRICT

CODESRIA - LIBRARY

BONDO DISTRICT : Administrative Boundaries



APPENDIX F

AUTHOR'S NOTE

This study was financed by a Thesis Writing grant received from the Council for the Development of Social Science Research in Africa (CODESRIA).

The author welcomes brief comments and criticisms to:

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Kisumu

KENYA

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