DEVELOPMENT AND EFFECTS OF COMPUTER-BASED SELF-LEARNING INSTRUCTIONAL PUZZLES ON JUNIOR SECODARY SCHOOL STUDENTS' LEARNING OUTCOMES AND RETENTION IN SOCIAL STUDIES

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ABSTRACT

Secondary school students' poor academic achievement in social studies has been attributed to the predominance of inappropriate instructional strategies in the teaching and learning of the subject. Scholars have recommended the use of a strategy that provides students with hands-on activities. Researches have shown the effectiveness of Computer-based Self-learning Instructional Puzzles (CSIP) in science related subjects but the use has not been given prominence in social studies. This study, therefore, designed, developed and determined the effects of computer-based self-learning instructional puzzles on Junior Secondary School students' learning outcomes and retention in social studies in Osun State. The moderating effects of gender and cognitive style were also examined.

The study was in two phases. The first phase was the design and development of the CSIP using CSIP Model. The second phase determined the effects of the package on Junior Secondary School (JS) II students' learning outcomes and retention in social studies. This phase adopted pretest-posttest quasi-experimental research design using 2x3x2 factorial matrix. One hundred and forty one JS II students from four purposively selected schools were randomly assigned to CSIP and conventional teaching strategy groups while the treatment lasted 14 weeks. Two research questions were answered and eight hypotheses tested at 0.05 level of significance. The CSIP Instructional Package Evaluation Questionnaire (r = 0.82), Students' Attitude towards Social Studies Questionnaire (r = 0.73), Social Studies Achievement Test (r = 0.89), Cognitive Style Checklist, Instructional Package Perception Questionnaire (r = 0.84), Instructional Guide on Computer-based Instructional Strategy and Instructional Guide on Conventional Teaching Strategy were used for data collection. Data were analysed using mean, standard deviation, Pearson's product moment correlation, Analysis of Covariance and Scheffe's post-hoc test.

The design of the package was rated appropriate in terms of functionality and navigation ($\bar{x}$ = 3.72), content and graphic evaluation ($\bar{x}$ = 3.66) and usability assessment ($\bar{x}$ = 3.62). Students' acceptance of the instructional package was also rated as follows: Perceived Usefulness ($\bar{x}$ = 3.24) and Perceived Ease of Use ($\bar{x}$ = 3.14). The correlation between students' perceived usefulness and perceived ease of use was significantly positive (r = 0.49) implying that the perceived usefulness of the package enhanced the use. There was a significant main effect of treatment on students' achievement ($F_{(1,128)}$ = 162.00; η^2 = .559). The CSIP group had a higher achievement mean score ($\bar{x}$ = 36.03) than the conventional group ($\bar{x}$ = 21.69). There was a significant main effect of treatment on students' retention ($F_{(1,128)}$ = 111.85; η^2 = .446). The CSIP group had a higher retention score ($\bar{x}$ = 32.63) than the conventional group ($\bar{x}$ = 21.69). There was no significant main effect of gender and cognitive style on students' attitude, achievement and retention in social studies.

The computer-based self-learning instructional puzzle package was an acceptable strategy to social studies students at Junior Secondary School level and also enhanced their achievement and retention in the subject regardless of sex and cognitive style. Hence, the strategy should be adopted in teaching social studies in classroom.

Key words: Computer-based self-learning instructional puzzles, Students' learning outcomes, Retention in social studies

Word count: 495

CERTIFICATION

I certify that this work was carried out by Mr Jubril Busuyi FAKOKUNDE in the Department of Teacher Education, University of Ibadan.

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DEDICATION

This work is dedicated to my parents**,** late Mr Fakokunde Ibrahim and Mrs Fakokunde Zynab who committed their efforts towards the success of their children but could not enjoy the fruits of their labour before they answered the call of Allah to the great beyond. May Almighty Allah grant them eternal bliss (Amen).

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INTRODUCTION

1.1 Background to the Study

The role of social studies in the socio-political and economic advancement of any society makes it relevant as a subject in the school curriculum since education is the major instrument for sustaining and transforming a society. According to Awe (1976), social studies if properly programmed and effectively taught will help solve social problems facing developing countries like Nigeria.

The Nigerian Educational Research and Development Council [NERDC (2008)] defines social studies as a way of seeing, viewing and approaching things with special regard to their proper place and function in the ordering and management of human's total nature, social and technological environment. Mezieobi, Fubara and Mezieobi (2008) view social studies as an integrative field of study which probes human's symbolic relationship with the environment, endows man with reflective or contemplate capacities, intellectual, affective, social and work skills to enable the understanding of the world, its problems so as to rationally solve or cope with them for effective living in the society. Akintunde (2004) cited in Akinseye (2008) posits that social studies is important because it deals with social problems which include poverty, war, foreign relations, divorce, inequality, injustice, human rights abuse/denial, unemployment and inflation, environmental pollution and degradation, health care, corruption in public life, vote-apathy, labour crisis, juvenile delinquency, cultism and crime. Ajiboye (2009) contends that the major goal of social studies is citizenship education. This implies that social studies is interested in equipping learners with the right type of knowledge, skills, attitude and values that will make them relevant in the society. Ojobo (2011) posits that social studies is concerned with the development of some socially relevant values and attitude in the learners

Social studies can serve as a viable vehicle for the stability and transformation of a society through a proper implementation of the curriculum via the utilisation of methods that are learner centred. To achieve the educational goals of social studies, the methods and strategies of instruction must be in line with the aspiration of the learners, should suit their interest and comply with modern development which focuses on active learning and must allow the learner to play active roles in the process of learning (Edwin, 2010; Hafeez, 2011). Elements of freedom, fun, individuality, practice, reinforcement and feedback must also be incorporated. According to Ojobo (2011), to make values and attitude stable and enduring, their formation should be premised on participatory, demonstrative and experiential engagement. Therefore, the scholar advocates active participation of learners in social studies classroom to strengthen their thinking,

skills and participatory abilities which will form a solid base for free and responsible actions that could lead to their individual and societal development. Hafeez (2011) and Schmidt (2010) reveal the prevalence of these attributes in computer-based instructional strategies. Achor and Shaibu (2013) submit that for social studies to produce effective students who would in turn contribute to the growth and development of their community, computer literacy via the utilisation as instructional strategy must be imbibed.

In spite of modern development in Information and Communication Technology (ICT) which has its root in the use of computer and the inherent benefits in instructional delivery, social studies classroom is still dominated by the use of conventional method where the teacher plays a domineering role in teaching-learning process. Orungbemi (2008) citing Maiwada (2004) asserts the prevalence of traditional method of instruction in Nigerian schools despite its effect on short-term memory coupled with boredom and overstressing of students' attention time. Kazi (1989) reveals that social studies class is characterised by content transmission, textbook recitation, story-telling, ground covering and cognitive memory questions and answers type of evaluation of learning outcomes. The study therefore advocates the adoption of modern approaches like dramatic play, role play, inquiry and simulation to enhance students' attitude and performance in social studies. Iyamu and Aduwa-Ogiegbaen (2008) show non-utilisation of educational technology resources by social studies teachers in Nigeria despite the tendency of improving students' learning outcomes and retention through the use.

Khaled and Chiodo (2004) show that social studies was viewed as a rut by students because they had a hard time enjoying the class due to the use of traditional method premised on textbooks with little thought-provoking materials thereby leading to negative attitude towards the subject. Yusuf (2004) attests to the use of inappropriate instructional strategy by social studies' teachers resulting into decline in Junior Secondary (JS) students' performance in the subject and therefore, advocates the use of instructional strategies which will equip the learners with analytic skill, reflective thinking and problem-solving tools that could enhance their performance in the subject. Jimoh and Akindoju (2010) reveal acute scarcity of computer based instructional package in social studies. Boughan and Kerwin (2006) also reveal low level of technology integration in social studies classroom unlike what operates in other subjects. The dominance of conventional method of teaching was also observed during a survey by the researcher to some selected secondary schools within Ilesa metropolis.

The prevalence of conventional method of instruction in social studies classroom coupled with low or no technology integration call for the adoption of instructional strategies that are Information Communication Technology (ICT) compliant and at the same time could enhance

active participation of students in social studies classroom. The National Policy on Education (2004) acknowledges the relevance of technological-based instructional strategies in instructional delivery but the only ICT tool recommended in the current Social Studies Curriculum in Nigeria is video clip which does not fully allow for active involvement of the learners in the teaching-learning process.

Social studies scholars have tried to bring interactivity into social studies classroom through different strategies. Abdu-Raheem (2011) investigates and recommends the use of discussion method in social studies classroom. Adeyemi (2008) looks into the effectiveness of cooperative learning and problem-solving strategies on students' academic achievement and suggests the adoption of the strategy in the social studies classroom while Adeyemi and Ajibade (2011) support the use of simulation games and brainstorming strategies. Students' academic achievement in social studies continues to remain flat or declined as asserted in Ayodeji (2009), Edozie (2009), Edinyang and Ubi (2012) and Ezeoba (2013) thereby resulting in negative students' interest and achievement in related courses like geography, law and sociology coupled with the inability of the students to apply desirable social and citizenship skills to their daily living.

The analysis of the Final Grade for Basic Education Certificate carried out in four selected schools by the researcher as presented in the Table 1.1 lays credence to poor Junior Secondary School students' academic achievement in social studies.

Table 1.1: STATE OF OSUN MINISTRY OF EDUCATION FINAL GRADE FOR BASIC EDUCATION CERTIFICATE RESULTS IN FOUR SELECTED SCHOOLS

YEAR	SCHOOL	A	B	C	P	F	AB	TOTAL
2011	I	-	-	-	18	47	-	65
	II	-	-	15	156	36	4	211
	III	-	-	15	86	26	5	132
	IV	-	-	2	85	66	14	167
2012	I	1	-	63	9	2	-	75
	II	-	-	33	194	10	5	242
	III	6	-	85	24	-	2	117
	IV	1	-	34	63	31	-	129
2013	I	31	-	54	7	-	-	92
	II	-	-	-	-	-	-	-
	III	-	-	31	95	15	3	144
	IV	19	-	83	42	13	4	161
TOTAL		58 (3.77%)	-	415 (27.04%)	779 (50.75%)	246 (16.03%)	37 (2.41%)	1535

Source: Schools Examination and Record Unit

Table 1.1 reveals that 30.81% of the candidates that took part in the examination between 2011 and 2013 passed social studies at credit level despite the relevance of the subject in equipping learners with skills, knowledge, values and attitude that could make them contribute meaningfully to the development of their society.

The persistent poor learning outcomes and retention in social studies despite the afore recommended strategies calls for further investigation into other strategies such as computer-based self-learning instructional puzzle due to the prevailing situation across the world which focuses on the use of computer-based ICT tools with elements of interactivity and self-learning which could assist in sustaining students' attitude and interest in the subject thereby resulting into improved learning outcomes and retention. Thus, necessitating the need to design, develop and use computer-based self-learning instructional puzzles with the aim of improving students' learning outcomes and retention in social studies.

Self-learning materials as viewed by World Health Organisation [WHO (1985)] refer to any resources that can be used by a learner without the presence of the teacher and without preventing the students from learning from other learners. The process of developing such material or package entails preparatory, implementation and evaluation phases. Self-learning instructional package according to Singh and Intarawong (2012) holds a great potential for individuals as well as group learning if properly and systematically developed in accordance with the needs of the learners. The researchers assert that such package allows individualised and self-paced learning, immediate personalised feedback and knowledge of progress. Mutiara, Zuhairi and Kurniati (2007) posit that learning materials must be designed in a way that they must be user-friendly, allow for self-study and independent learning activities which could be applied in social studies.

This study therefore focused on the design and development of self-learning computer-based instructional puzzles premised on a model which incorporates elements from Dick and Carey (1996), Tripp and Bihhelmeyer (1990) and Roblyer (2006) in line with Crowder's branching programme which according to Owen and Aworuwa (2005) could develop critical thinking ability of the learners which is needed to function effectively in the society.

Technology integration according to Mayben (2005) implies viewing technology as an instructional tool for delivering the subject matter in the curriculum already in place. It entails students constructing their learning using hardware and software tools. Mayben (2005) asserts that technology should be used in classrooms based on the fact that; it is in the environment of the students, it is in their homes, it is around their neighbourhood and also promotes project-based

learning thereby making the teacher become a mentor and a guide. Boughan and Kerwin (2006) posit that integrating technology into the classroom is a great way to bring students the interaction, pacing and sources they need to successfully master materials. Foltos (2002) also links improved learning outcomes with the application of technology based learning strategies in instructional delivery.

The adoption and use of any instructional media, material, strategy or method should be determined by the perception of the user. According to Davis (1989), the adoption and use of technology is determined by the perceived usefulness and perceived ease of use. While perceived usefulness refers to the degree to which a person believes that using a particular system would enhance his or her job performance, perceived ease of use focuses on the degree to which a person believes that using such technology would be effortless. According to Nida (2006), the perception of the users of a new software package would determine the acceptance. This submission corroborates Dillon and Morris (1996).

For any instructional strategy to be relevant, it must enhance learning outcomes and retention. Adams (2004) posits that learning outcomes are concerned with the achievement of the learners rather than the intention of the teacher as expressed in the aims of a module or course. University of Warwick (2004) views learning outcomes as skills and knowledge a student will possess upon a successful completion of a course work. The American Association of Law Libraries (2004) defines learning outcomes as statements that specify what learners will know or be able to do as a result of learning activities which may be expressed as skills or attitude. According to Kaya (2011), attitude is a learnt tendency that forces individual to exhibit certain behaviour towards a particular person, object or condition. The scholar posits that it will be difficult for a teacher to form learning experiences and achieve the desired behavioural change without due consideration of the students' attitude. This postulation shows that student's attitude towards a subject or instructional strategy will affect learning outcomes and retention in the subject.

Lim and Morris (2009) identify reinforcement, course relevance, interest, self-efficacy and the learner as factors influencing learning outcomes. Citing Malone (1981), Lim and Morris assert that when a learning task is challenging and involves fantasy during the learning process, learners will be motivated. To them, learning involvement is the degree to which learners interact with other learning components (that is, learning content, learning activities, peer-learners, tutors and instructors). The attributes of computer-based instructional puzzles in terms of learners' engagement and reinforcement make the investigation of its effectiveness on learning outcomes and retention relevant.

The American Heritage Dictionary (2007) defines retention as the ability to recall or recognise what has been learned or experienced. According Stephen (1991), students must retain information from classroom in order to benefit from learning and therefore posits that retention is directly affected by the degree of original learning. Hagnie (2007) acknowledges the relevance of delayed retention in learning with the view that it represents the information and concepts that the student still knows three or more weeks after the effect of cramming for test has evaporated. Dougal (2011) examines retention by comparing the results obtained from pre, post and one-week post tests conducted after exposing the learners to three different methods of teaching while Ramsey (1996) measures retention by comparing the results of test conducted two weeks after the measure of original learning carried out immediately after instruction.

From the studies of Ramsey (1996), Hagnie, (2007) and Dougal (2011), it can be inferred that retention can be measured as from a week after the conduct of an initial test. Retention according to Stephen (1991) is affected by the amount of practice. Oladele (2004) advocates active involvement of learners in the learning situation, acceptance of responsibility for their learning and learning in a threat free learning environment in order to enhance learning outcomes and retention. Dale (2011) shows that learning retention rate is influenced by the learning experiences and the media. Dale further reveals that practice by doing method enhances knowledge retention up to a level of 75%.

Scoboria (2007) reveals that lecture method promotes passivity in learning process, does little to promote retention of learned material, does not promote time spent on-task, results in little student to student or student to instructor interaction and frequently makes it difficult for instructors to obtain feedback thereby necessitating the need to adopt instructional methods and strategies that will be learner-centred. The drive towards enhancing students' learning outcomes and retention in social studies classroom calls for research into teaching methods and strategies based on modern technology capable of making learners engaged and interested in their studies. The attributes inherent in puzzles and computer-based instruction make the choice of computer-based instructional puzzles the focus of this study.

Puzzles as defined by Cambridge Advanced Learner's Dictionary (2008) is a game or toy in which you have to fit separated pieces together, or a problem or a question which you have to answer by using skill or knowledge. It further defines it as to think hard about something in order to understand it. The New International Webster's Comprehensive Dictionary of English Language (2004) views puzzle as, to solve by investigation and study. Longman Dictionary of Contemporary English (2005) defines "puzzle" as a game in which you have to think hard to

solve a difficult question or problem. Scott (2002) defines "puzzle" as nothing but a problem that is fun to solve.

The fun and activity involved in puzzles make them relevant as an instructional strategy. Ackert (2009) advocates the use of puzzles for children of all ages. According to the scholar, puzzles teach shape, colour, letter and word recognition skills, sensory perception, fine motor skills such as grasping and manipulating objects; hand-eye coordination, spatial reasoning; problem solving/reasoning skills; sorting and classifying; organisation skills; self-confidence; social skills/cooperative play. The scholar's therefore advocates the use of puzzle throughout a child's educational years and asserts that such will benefit the child in all subject areas. Ann (2006) also supports the use of puzzle-based instructional strategy at all educational levels based on the experience acquired as an educator and availability of puzzles for all ages which also go in line with the submission of Nelson (2011).

Phil (1995) asserts that one of the advantages of personal computers is that they help young and old children develop appetite for logic puzzles. Phil submits that puzzle should be made easier in order to make them appealing to children and avoid frustration. Michalewicz and Michalewicz (2007) identified some criteria for good educational puzzles with reference to Mathematics. These are; generality- educational puzzles should explain some universal mathematics solving problems; simplicity- **e**ducational puzzles should be easy to solve and remember; eureka factor- educational puzzles should be interesting; entertaining factor- educational puzzles should be entertaining. The criteria for mathematics puzzles as stated above can as well go for social studies puzzles since both are subjects in the school curriculum and the criteria are necessary for effective learning within an instructional system. There are different categories of puzzles such as wooden, jig saw, world search, hidden picture, word and logic puzzles. Puzzles can be made of wooden or plastic materials, they can be on game-boards or paper, and can also be electronic as done in this study.

The design and development of computer-based self-learning instructional puzzle in this study is premised on the qualities inherent in it. Puzzle allows for practice, repetition and is imbued with elements of fun and certain level of anxiety necessary for learning. According Michalewicz and Michalewizc (2007), puzzle-based learning allows the learning of problem-solving skills by experience; imitation and reflection. Phil (1995), Aremu and Ayelaagbe (1997), Coulter (2003), Kaka (2008), Falkner, Saoriamarthi and Michalewicz (2009) reveal the effectiveness of puzzle in promoting academic achievement. Scholars such as Idowu and Ige (2007), Alemi (2010), Adedoja, Abidoye and Afolabi (2013) have also revealed the effectiveness

of puzzle in promoting academic achievement in different subjects including social studies. These previous studies were not self-learning or computer- based.

The drive towards relevance in terms of ICT has necessitated the need to encourage the use of computers for instruction at all academic levels. The 2007 Computer Studies Curriculum for Junior Secondary School states that the computer is a major component of ICT which has singularly and dramatically continued to change the behaviour pattern of people and corporate entities by determining the way they socialise, learn, shop, conduct business, communicate and interact for multi-dimensional mutual reasons. Lawal and Abdullahi (2002) contend that educational status is increasingly taking advantage of new tools offered by the computer industry. The researchers posit that teachers are now using a specialised application package called Computer Managed Instructions (CMI) to administer, deliver and state tests, to keep track of students' grades and to create students' progress reports. In their view, the computer is an ideal resource, for simulation of science experiment, modeling in economics, graphics in arts and design and assessing a large database in geography, history and geology. Sewell (1990) citing Sloman (1978) sees a modern digital computer as perhaps, the most complex toy ever created by man. Quoting Chandler (1984), computer-based instructions allow for individualisation of instruction and enhance interactivity which promotes active learning.

Ajelabi (2005) posits that teachers should help learner develop their collaborative learning skills, critical thinking skills and moral character by adopting the use of microcomputer. To Ajelabi, computer-assisted instruction is an automated instructional technique in which a computer is used to present an instructional programme to the learner through an interactive process on the computer. Abimbade (2006) asserts that technology is changing our expectation of what students will learn, how and where they will learn it so as to function in the new world order. Different researches have shown the effectiveness of computer-based instruction on academic achievement. Kimberlee (2010) shows that children exposed to computer-based learning intervention performed better in early reading skills. The interactivity and the need to align with modern technology have made computer relevant in instructional delivery. Computer-based puzzles allow for interactivity, immediate knowledge of result, reinforcement and practice which are necessities for effective learning.

Poor reading habit among Nigerian students also calls for the adoption of instructional methods and strategies that conform to what students like doing coupled with the ability to enhance learning. Ifedili (2009) asserts that many students do not like reading. Solarin (2009) observes poor reading culture among youth and attributes it to their commitment to watching

cartoons. Harold (2001) and Obafemi (2006) also assert that poor reading culture among students is a problem. Obafemi (2006) reveals the commitment of people to stay in their homes and watch video. Studies have also affirmed the attachment of students to electronic media. Munoz (2007) shows that, young children begin to show interest in the home personal computer in their toddler years. This finding is in line with the submission of Singh (2009) that it seems technology especially computer has been with the children since birth. Prensky (2001) also alludes to the fact that today's students spend their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones and all other toys and tools of the digital age. Adebowale, Adewale and Oyeniran (2010} reveal that secondary school students possess high level of interest, approval and confidence in the use of computer.

The above revelations on the attachment of Nigerian students to electronic media demand the use of methods and strategies that are electronically-based and could at the same time enhance learning. Since computer-based instructional puzzles are educational and entertaining, the utilisation as instructional strategy will go a long way in making learning interactive and pleasant. Dada (1999) identified three important elements to be considered within an instructional system; the teacher, learner and subject matter. Dada submits that for there to be successful learning, the learner has to interact meaningfully with the subject matter.

Researchers have identified gender difference in academic performance. Okeke (1999) contends that gender exerts great influence in determining who goes to school, how well they do and how far they progress. Awoniyi (2000) highlights gender differences in academic achievement. Afuwape and Oludipe (2008) find gender difference in academic achievement in integrated science among pre-service teachers. Abdulrahman (2008) avers no significant gender difference in test of science knowledge among Junior Secondary School students. Maliki, Ngban and Ibu (2009) find significant gender difference in academic achievement. Canada and Brusca (1991) citing Lockard, Abrams and Mary (1987) acknowledge technological gender gap which is defined as the idea that males and females have different technology related attribute, behaviour and skills. Canada and Brusca submit that if the gender technological gap is ignored, it could render large number of female students unprepared to meet the technological challenges of the future. The scholars assert that inequalities tend to appear along socio economic and gender lines with male students and students from high socio-economic backgrounds better positioned. Aremu (2008) cited in Aremu and Fasan (2011) asserts the presence of gender disparity in computer competence and use with the male being better disposed. However, Aremu and Fasan (2011) finds significant difference in male and female teachers' computer self-efficacy with the female rated higher. The divergent views of different scholars in terms of gender influence on learning

outcomes have informed considering the effect of gender on learning outcomes and retention in this study.

Studies have also shown that cognitive style has impact on learning outcomes. According to Steele (2003), cognitive style refers to a person's preferred pattern of mental thinking as demonstrated over time. According to Weimer (2008), cognitive styles reflect an individual's typical or habitual mode of problem-solving, thinking, perceiving and remembering. Ormrod (2008) asserts that students with the same intelligence level approach classroom tasks and think about classroom topics differently based on their cognitive style. Tinajero and Paramo (1997) show the significant effect of cognitive style on students' performance in different subject areas. Hall (2000) reflects the effect of cognitive style on academic achievement. However, Steele (2003), Altun and Cakan (2006) do not find any significant effect of cognitive style on academic achievement. The divergent findings of various scholars on the effect of cognitive style on academic achievement make the study of its moderating effect in this study relevant based on Witkins' (1962) categorisation of cognitive style into field dependence/field independence.

According to Hall (2000), field dependent/field independent is an established cognitive style that correlates with particular abilities and often predicts success in traditional and computer-based instructional environments. In the view of Liu and Reed (1994), field dependent/independent is generally considered to describe learners along a testable, value neutral bipolar continuum such that individuals at one end are measured as field dependent while individuals at the opposite end are considered field independent and subjects at the middle of the range are referred to as field mixed or field neutral. Maghsudi (2007) shows a significant difference between field dependent and field independent students with the field independent students scoring higher marks in English Language.

The influence of cognitive style on academic performance cannot be under estimated. There have been divergent results from various scholars thereby calling for the determination of its effects on learning outcomes and retention in this study. Further, most of the available literature on cognitive style in relation to field dependent and field independent are foreign-based hence, the need for the determination of its effects on learning outcomes and retention within the local environment. Literature reviewed reveals that researches on cognitive style remained polarised based on field dependent and field independent while that of field mixed or field neutral which this study incorporated has not been effectively addressed.

This study therefore designed, developed and determined the effect of computer-based self-learning instructional puzzles on learning outcomes and retention of Junior Secondary School

II students in social studies. It also examined students' acceptance of the computer-based self-learning instructional package and the moderating effects of gender and cognitive.

1.2 Statement of the Problem

The essence of social studies as a subject in the school curriculum is to serve as a vehicle for equipping learners with requisite knowledge, skills and attitude to function effectively in the society. Meanwhile, scholars in the field of social studies have identified persistent students' poor learning outcomes in social studies and inability to transfer learning to solving real life problem due to the predominance of lecture strategy in social studies classroom. Instructional puzzles have been identified as one of the strategies that could facilitate positive attitude, academic achievement and improved retention. This strategy has not been given prominence in social studies classroom and where puzzles are used, they are not computer-based and therefore, are not in compliance with modern technology and growing interest of students in computer related devices.

This study therefore designed, developed, and determined the effects of computer-based self-learning instructional puzzles on Junior Secondary School students' learning outcomes and retention in social studies. It also determined students' perceived usefulness and perceived ease of use of the computer-based self-learning instructional package. Further, the effect of gender and cognitive style as moderating variables were determined.

1.3 Research Questions

1. What is the perceived usefulness of the computer-based self-learning instructional package by JS II social studies students?
2. What is the perceived ease of use of the computer-based self-learning instructional package by JS II social studies students?

1.4 Hypotheses

Eight null hypotheses were generated and tested at 0.05 level of significance based on the topic. These are:

H_{o1}: There is no significant relationship between JS II social studies students' perceived usefulness and perceived ease of use of the computer-based self-learning instructional package.

H_{o2}: There is no significant main effect of treatment on Junior Secondary School (JS) students'

i. attitude to social studies

ii. achievement in social studies

iii. retention in social studies

H_{o3}: There is no significant main effect of gender on Junior Secondary School (JS) students'

i. attitude to social studies

ii. achievement in social studies

iii. retention in social studies

H_{o4}: There is no significant main effect of cognitive style on Junior Secondary School (JS) students'

i. attitude to social studies

ii. achievement in social studies

iii. retention in social studies .

H_{o5}: There is no significant interaction effect of treatment and gender on Junior Secondary School (JS) students'

i. attitude to social studies

ii. achievement in social studies

iii. retention in social studies

H_{o6}: There is no significant interaction effect of treatment and cognitive style on Junior Secondary School (JS) students'

i. attitude to social studies

ii. achievement in social studies

iii. retention in social studies

H_{o7}: There is no significant interaction effect of gender and cognitive style on Junior Secondary School (JS) students'

i. attitude to social studies

ii. achievement in social studies

iii. retention in social studies

H_{o8}: There is no significant interaction effect of treatment, gender and cognitive style on Junior Secondary School (JS) students'

i. attitude to social studies

ii. achievement in social studies

iii. retention in social studies.

1.5 Scope of the Study

This study covered Junior Secondary School two (JS II) students in Ilesa East and Ilesa West Local Government Areas of Osun State. Schools were selected within Ilesa metropolis as a result of availability of power supply for the experimental group. The selection of JS II students is based on the fact that the topics selected for the study are in the Social Studies Curriculum for the class as stipulated in the 2007 edition of the Nigeria National Curriculum for Social Studies

The selected topics are based on three themes: science, technology and society; storage; and national economy. These themes are subdivided into seven topics in the curriculum as follow

i. Home appliances
ii. Dangers in the wrong use of appliances
iii. Meaning and ways of storage
iv. Things we store and why we store them
v. Savings and ways of saving
vi. Keeping money in banks
vii. Resources

1.6 Significance of the Study

The package developed for this study would contribute to the integration of computer-based technology into social studies classroom. It is expected that the package would expose social studies teachers and students to the use of computer-based self-learning puzzle in social studies classroom. The findings of this study would also reveal the efficacy of computer-based self-learning instructional puzzle in facilitating learning and retention in social studies. It would serve as a veritable guide to policy formulators and curriculum designers to decide on how best to integrate technology via computer-based self-leaning instructional puzzles into the school curricular to enhance learning, make it interactive and pleasant. Findings from the study would reveal the desire of secondary school students to learn social studies through computer-based self-learning instructional puzzle.

1.7 Operational Definition of Terms

Achievement in social studies: The performance of JS 11 students as reflected by scores obtained in the Social Studies Achievement Test (SSAT).

Attitude to social studies: The disposition of JS 11 students to social studies as a subject in the school curriculum as obtained in the Social Studies Attitude Questionnaire (SSAQ).

Cognitive style: This is a mode of learning by JS 11 social studies students based on their responses to the Cognitive Style Checklist used in this study. This could be Field Dependent (FD), Field Independent (FI) or Field Neutral (FN).

Computer-based self-learning instructional puzzle: This is an instructional package designed and developed for the study.

Design and development: The activities dealing with the gathering and processing of information into the computer-based self-learning instructional puzzle package used in this study.

Learning outcomes in social studies: These refer to JS11 students' attitude and academic achievement in social studies.

Retention in social studies: The performance of JS 11 students as reflected in the scores obtained in the Social Studies Achievement Test (SSAT) based on delayed test conducted by the researcher.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter deals with the theoretical background to the study, models for the study and review of related literature.

2.1 Theoretical background

The study is based on the stimulus-learning with reinforcement theory propounded by Edward Thorndike.

2.1.1 Edward Thorndike (1874-1949) Theory of Connectionism.

Edward Thorndike investigated learning in animals by using a cat. He confined a hungry cat in a puzzle box with food visible on the outside but the cat must find a way of escape in order to get the food. He installed a release mechanism which could be operated by the cat in order to escape and eat the food. The cat exhibited random movement when first placed in the box before it eventually stumbled on the release mechanism which allowed it to eat the food. On subsequent trials, the activity became less random and focused on the part of the cage near the release mechanism. Thorndike therefore, concluded that animals learn through active behaviour, accident and chance to succeed. He further proposed three laws of learning which are:

(i) **Laws of effect:** This refers to the satisfaction or dissatisfaction derived from performing an action. Thorndike concluded that if a satisfactory behaviour is immediately rewarded, the behaviour is strengthened. However, if a satisfactory reward is not received, the behaviour is subdued and will later fade.

(ii) The law of exercise: This implies that practice is required in learning. Repetition strengthens the connection between the stimulus and the response. Thorndike submits that repetition without feedback would not strengthen behaviour which led to the incorporation of feedback into the theory

(iii) Law of readiness: This addresses the preparedness of the learner to learn. According to the theory, a learner must be mentally and physiologically prepared to learn before learning can take place. A learner must be mentally set to perform an instructional task based on motivation before learning can take place.

Oluyori (2005) while looking into classroom application of Thorndike's Law posits that: classroom experience should be satisfactory and pleasant based on the creation of interesting learning situation, learning should be made meaningful and relevant to learners' experience and background, the use of reinforcement or reward should be adopted, learning activities should be

orderly and sequential, there should be removal of unpleasant or annoying situation associated with learning, opportunities should be given for practice of learned task, encouragement of drilling, learners must be naturally ready for the learning task, conducive and motivating learning environment should be provided.

Prakash (2011) while looking into the relevance of the theory in instructional delivery states that any behaviour which brings a feeling of pleasure is more effectively learnt, therefore, if a child succeeds in doing a thing, in solving a problem or in working out a sum, he /she is pleased about his/her achievement and this feeling of satisfaction motivates him/her to do better and make further efforts. Success leads to further success and failure leads to further failure. Therefore, Prakash posits that every child should be provided with such learning situation that promotes success and satisfactory learning. Citing Dave (2007}, Prakash (2011) asserts that reward is important in learning because it strengthens the occurrence of desired behaviour and discourages the undesired one.

This theory is relevant to this study as the package can be worked on repeatedly by the learner in accordance with the law of exercise. Feedback is also incorporated in order to make the exercise relevant to learning based on the law of effect. A learner is applauded electronically for providing an appropriate answer to a question in the puzzle and is able to move to the next question. In order to prevent frustration due to inability to solve a question, the learner is allowed to click the hint menu for a clue to the appropriate answer. A learner that is unable to solve the question after checking the hint menu is allowed to go to the solution menu for the answer.

The law of exercise implies that practice is required in learning and repetition strengthens the connection between the stimulus and the response. In the view of Prakash (2011), learning and retention are facilitated through use or exercise. Exercise or drilling is more effective when it is associated with pleasure and purpose. Teachers should therefore make the practices purposeful and interesting in order to ensure better learning. The package designed for this study allows for practice and individualisation of instruction. Students can work on it repeatedly without the domineering influence of the teacher that characterises the traditional mode of instruction.

The law of readiness addresses the preparedness of the learner to learn. The learner must be mentally and physiologically prepared. He/she must be mentally set to perform the instrumental task owing to motivation which in his experiment is hunger. Prakash(2011) asserts that if a child is not ready to learn, he/she cannot learn effectively. To him, readiness is a mental set and therefore, a teacher must develop in the child the readiness to learn by giving interesting problems to solve and good audio-visual materials to enhance learning. In order to prepare the learners to learn, there is menu for objectives and content. The statement of the objectives for each topic as

stipulated in Social Studies Curriculum could help in focusing the attention of the learners as they are aware of the expected behaviour after interacting with the instructional package. The content is also presented with the incorporation of relevant pictures that could motivate the learners to learn without the feeling of boredom often associated with the conventional classroom environment, and the use of computer-based puzzle is due to the attachment of learners to computer related devices.

This theory is also relevant to the study because it incorporates active learning. The learner is able to interact with the information via computer-based puzzles. It also has element of motivation since a time limit is set for the completion of each puzzle which inspires every learner to strive towards meeting the time set. The element of immediate knowledge of result and the stipulation of the objectives tend to secure the learners' attention and prepare them towards learning serve as motivation.

2.1.2 Dick and Carey Instructional Design Model

The Dick and Carey (1996) Instructional Design Model focuses on a systematic approach for designing instruction. It entails all the phases of an iteractive process that start by identifying instructional goals and end with summative evaluation premised on a linear progression of steps in the design process.

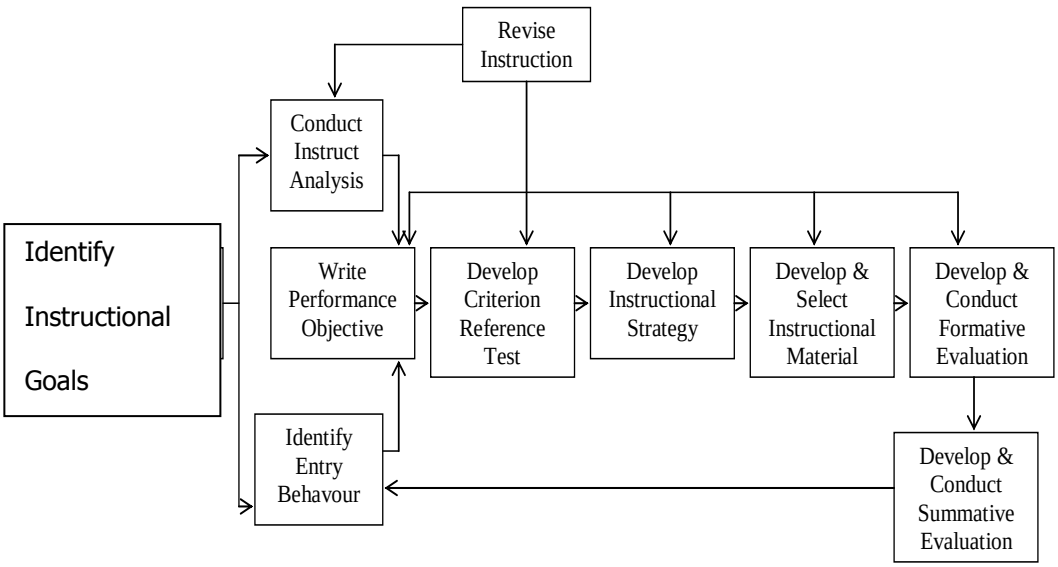


Figure 2.1: Dick and Carey Instructional Design Model

Source: Flow chart and Table from Sherri Braxton's site on instructional design model

The model is systematic with procedural steps made up of the major process components which consist of ten basic steps in an iterative cycle and a culminating evaluation of the effectiveness of the instruction.

The components are as follows:

i) Assess needs to identify instructional goals. This entails identifying what the learners should be able to do at the end of the instruction.

ii) Conduct instructional analysis. This entails the determination of what learners will do in order to achieve the goals of the instruction and the skills and knowledge required.

iii) Analyse learners and contexts. These deal with examining learners' present skills, preference and attitude as well as the characteristics of instructional setting.

iv) Write performance objectives: This refers to the stipulation of what the learners should be able to do, the conditions and criteria.

v) Develop Assessment Instrument: This entails the development of instrument(s) that will be used to assess the achievement of the stated objectives.

vi) Develop instructional strategy: This involves the development of the means through which Instruction will be delivered.

vii) Develop and select instruction. That is, to use the instructional strategies to produce the instruction.

viii) Design and conduct formative evaluation.

ix) Revise instruction

x) Design and conduct summative evaluation.

This model is relevant to the study in the aspects of the identification of instructional goals, statement of performance objectives, entry behaviour, and development of instructional strategy and incorporation of formative evaluation. The instructional goal is derived from the role social studies is expected to play as stated in the Nigerian social studies curriculum for Junior Secondary School. The performance objective refers to the knowledge, attitude and skill the learner should have acquired at the end of an instruction.

The performance objective is in accordance with the stipulation in the curriculum in relation to the topics selected for the study. The entry behaviour is also taken into consideration in the selection of the participants. The participants are JS11 students due to the fact that they have been exposed to computer studies at Junior Secondary School one (JS1). The selected strategy is computer-based instructional puzzle due to students' interest in electronic media and computer related devices. The strategy incorporates formative evaluation in the sense that it allows for

immediate knowledge of result with reinforcement when correct response is given to each item on the puzzle.

2.1.3 Rapid Prototyping Model of Tripp and Bichelmeyer

The Rapid Prototyping Model of Tripp and Bichelmeyer (1990) has its root in the design of software in software engineering but was adapted to the design of instruction by Tripp and Bichelmeyer who posits the model as a viable model for instructional design in computer- based instruction. The model allows for pragmatic design principle of minimum commitment which focuses on synthesising and limiting the design necessarily on solutions to problems at hand at that time. It entails a succinct analysis of content, statement of objectives on the basis of which prototype is structured and trial-tested before the development and evaluation of the final product.

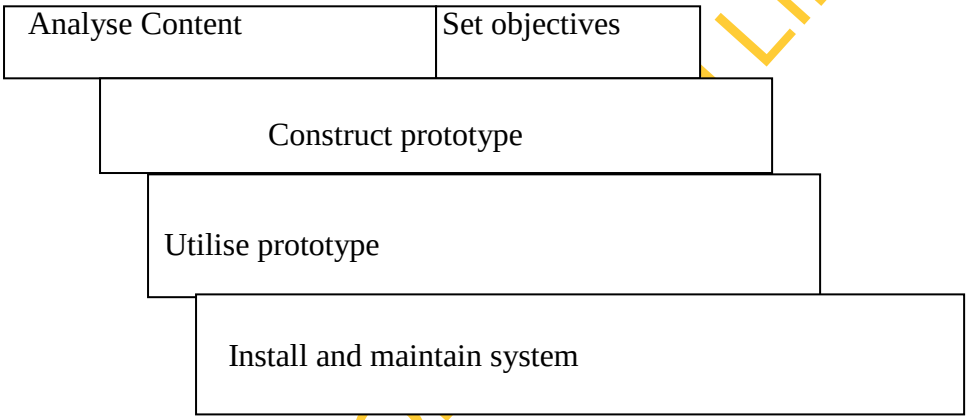


Figure 2.2: Rapid Prototyping Model of Tripp and Bichelmeyer (1990)

Source: Rapid Prototyping: An Alternative Instructional Design Strategy by Tripp and Bichelmeyer (1990)

The model is relevant in the design and development of the computer-based self-learning instructional package such that the content of the selected topics is broken down in a way that allows for its incorporation in to the instructional puzzle based on the stipulated objectives for the selected topics in the National Curriculum for Social Studies (2007). A prototype of the computer-based puzzle software was designed and trial-tested in selected schools using representative sample, that is, students who shared the same characteristics with the proposed participants.

The selected students interacted with the computer-based puzzle while the researcher served as observer. Observations and challenges encountered were taken into consideration in the design of the final package. The package was used to evaluate the effects of computer-based self-learning instructional puzzle as instructional strategy in relation to students' attitude, achievement and retention in social studies.

2.1.4 Technology Integration Planning Model of Roblyer

The Technology Integration Planning (TIP) Model of Roblyer (2005) was adopted in integrating technology into social studies classroom by Boughan and Kerwin (2006). The model is made up of five phases which are:

Phase 1: Determining Relative Advantage. This entails the identification of current teaching problems or areas for potential growth before selecting technology based methods that could offer solution or improvement.

Phase 2: Decide on Objectives and Assessment: These involve stating what the students should be able to do at the end of the instruction along with the assessment procedure.

Phase 3: Design Integration Strategies: This deals with the designing of instructional strategies that will lead to the achievement of the stated objectives with due consideration of the needs of the learners as well as environmental restrictions.

Phase 4: Preparing Environment: This involves the provision of the resources necessary for the integration of technology. These resources include hardware, software and technical support.

Phase 5: Evaluate and Revise: This entails assessing the effectiveness of the technology and working on it for improvement. The phase looks into what worked well and what could be improved in integrating technology into classroom.

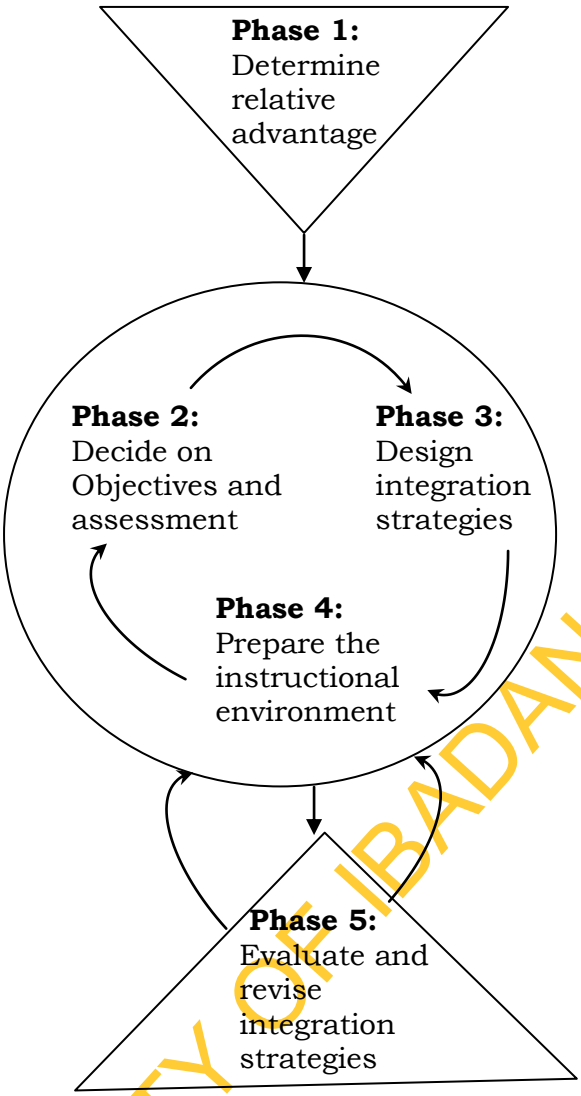


Figure 2.3: Technology Integration Planning (TIP) Model.

Source: Integration Educational Technology into Teaching by Roblyer (2005)

This model is relevant to this study since it is based on integrating technology into social studies classroom based on the need to allow social studies students explore and experience the world in a virtual way (Boughan and kerwin 2006). The relative advantage of the strategy includes its interactivity which could enhance the retention of what was learnt. The objectives to be achieved via the strategy are based on the stipulations in the National Curriculum for Social Studies on the selected topics and are incorporated into the package in order to motivate the learners. The instructional environment is also relevant in the study which accounts for the request for functional computer laboratory and power supply in schools that were used.

2.1.5 Computer-based Self-learning Instructional Puzzle Model

The model was designed for the design and development of the computer-based self-learning instructional puzzle premised on elements selected from Instructional Design Model of Dick and Carey (1996), Rapid Prototyping Model of Tripp and Bichelmayer (1990) and Technology Integration Model of Roblyer (2005).

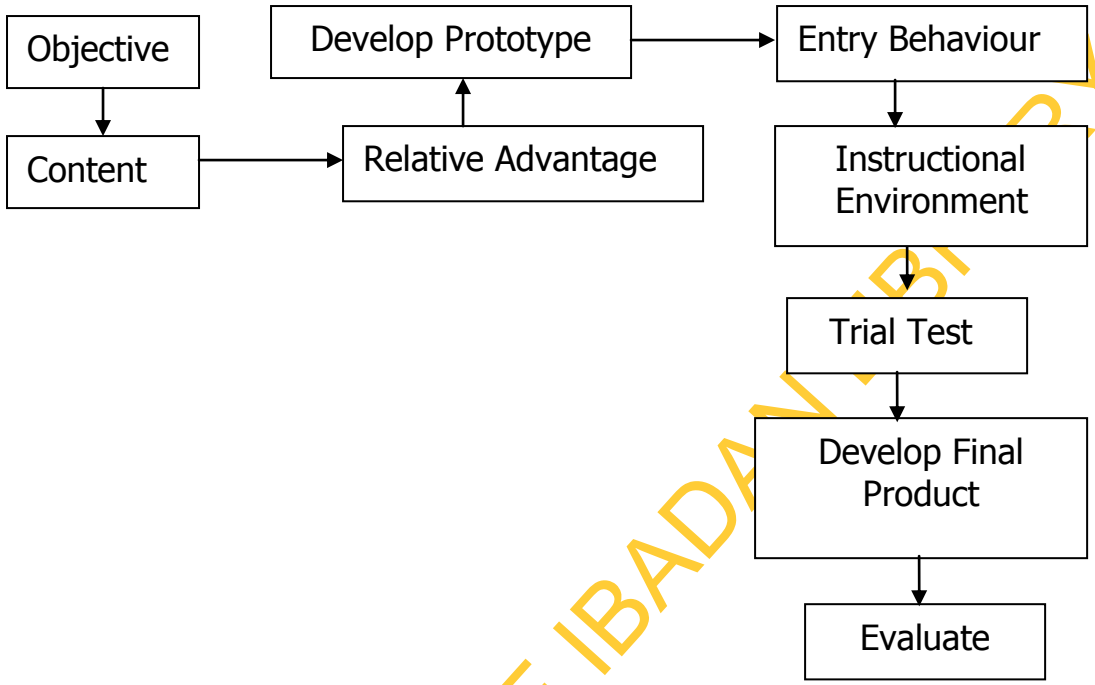


Figure 2.4: Computer-based Self-learning Instructional Puzzle Model

The model is made up of nine stages as explained below:

Stage I: Objective

This stage is a common element in the three models. The stage requires the statement of the behavioural objectives of each of the topics selected in the study as stipulated in the curriculum. The behavioural objectives for each topic were derived from Junior Secondary School (JS) social studies curriculum and incorporated into the objective menu of the package.

Stage II: Content

This element is derived from the Rapid Prototyping Model of Tripp and Bichelmeyer (1990). It involves the breaking down of the content and incorporating it into the content menu of the package. Therefore, the content of each topic was analysed to determine the depth of coverage, sequence of information and usage of language in accordance with the curriculum. The content for each topic was incorporated into the package content menu and the real puzzle aspect of the package.

Stage III: Relative Advantage

This element is derived from Technology Integration Model of Roblyer (2005). It entails the identification of the current problems in the teaching-learning situation and identification of areas for growth in the selection of technology-based methods or strategies that could offer solutions to the problems identified or improve the prevailing situation. Poor learning outcomes and retention in social studies which have been attributed to the dominance of lecture method in social studies classroom coupled with non-utilisation of technology-based strategy despite students' favourable disposition to it and its effectiveness in enhancing learning outcomes and retention were identified before the design and development of the computer-based self-learning instructional package in this study. The benefits inherent in this package include; active participation of the learners in the learning process, learning in a threat free environment with element of fun coupled with immediate knowledge of result.

Stage IV: Development of Prototype

This element is derived from Rapid Prototyping Model of Tripp and Bichelmeyer (1990). It entails the development of the prototype and trial-testing it before the development of the final product. The prototype of the computer-based self-learning instructional puzzle was developed and validated in stages as follows:

Prototype without separate content menu

Prototype with content menu without pictures

Prototype with content menu and relevant pictures

Stage V: Entry Behaviour

This element is derived from Dick and Carey (1996) Model of Instructional Design. This has to do with the identification of the required skill, knowledge and attitude needed by the learners in order to work on the package. For a learner to work on the package designed in this study, he/she should be able to handle the mouse, keyboard, type and drag items on a computer system. These accounted for the selection of JS II students since they should have been exposed to basic practical aspect of computer studies at JS I.

Stage VI: Instructional Environment

This is derived from Technology Integration Model of Roblyer (2005). It involves the assessment of the instructional environment in terms of the needed resources for the integration of the technology into the teaching-learning process. The computer-based self-learning instructional puzzle design and developed in this study requires functional computer laboratory for its utilisation. This explained the selection of schools with functional computer laboratory and electric power supply in this study.

Stage VII: Trial Test

This is derived from Rapid Prototyping Model of Tripp and Bichelmeyer (1990). This deals with the utilisation of the prototype in order to assess the appropriateness and make necessary correction before the development of the final product. The prototype developed in this study was trial tested on students who were not part of the study but shared the same characteristics with the participants at all the stages involved in the development of the prototype.

Stage VIII: Development of Final Product

This is an element of Dick and Carey (1996) Instructional Design Model. It deals with the production of the final product after necessary corrections have been made based on what was experienced in the process of trial-testing the prototype. The computer-based self-learning instructional puzzle was developed based on suggestions from educational technologists, students, social studies teachers and observations during the process of trial-testing. The final products contain the following menu:

The introduction menu: This introduces the learner to the package

The objective menu: This contains the behavioural objectives for the lesson as stated in the curriculum

The instruction menu: This gives specific information on how to work on the package

The content menu: This deals with the subject matter of each of the topics

The puzzle menu: This is where the puzzle to be filled is displayed

The hint menu: This contains clue to the correct response to each question in each of the puzzles

The solution menu: This contains a complete solution to the puzzle

A learner is always applauded for given correct response to any of the items in the puzzle. It is also possible to navigate backward or forward using the mouse while working on the package.

Stage IX: Evaluation

This is a common element in all the three models that were integrated for the development of the package. It entails the assessment of the package developed in term of its effectiveness in achieving the desired objectives. The package in this study was evaluated by exposing participants in the experimental group to it for a period of eight weeks after which its effectiveness on students' attitude, achievement and retention was measure.

2.2 Conceptual Review

2.2.1 Self-Directed Learning

The idea of self-directed learning can be traced to the period of classical philosophers such as; Socrates, Plato, Aristotle, Alexander the Great, Ceasar, Eramus and Descrates. It came to prominence in the last few decades and has since become a major area of research. According to Hiemstra (1994), self-directed learning involves individual learner taking responsibility for various decisions associated with the learning. According to the author, it is imbedded to some degree in every person and learning situation without preventing learning in association with others. In the view of Nkembe and Okon (2006), self-learning is a technique that involves the use of instructional material designed so that students can learn either without a teacher's intervention or with minimum guidance. The authors assert that the technique should include a set of stimuli provision for response, feedback and test of self-assessment package. In the view of Patricia (1998), the traditional mode of learning does not always result in rapid dissemination of information and or at low cost whereas, self-directed learning allows the learner to play a major role in the teaching-learning process thereby allowing the learner to exert certain level of autonomy based on the comprehensiveness and flexibility inherent in it.

Olanrewaju (2005) while justifying the use of self-learning instructional technique views the need for instructional practice to be learner centred and therefore advocates the production of learning materials that would serve as supplementary or even total learning resources which learners can fully use and gain adequate knowledge. Calderword (2014) lends support to the use of self-learning instructional materials based on the benefits identified below.

- Students learn to accept responsibility for their learning
- Students gain freedom to learn without restrictions associated with traditional method of instruction
- Students are motivated based on intrinsic reward embedded in self-learning package
- Students are able to retain information learnt more naturally

In the view of Postlethwait (1969), self-learning package has the following characteristics, it;

- emphasises individualisation of instruction
- develops the capacity for self-paced study
- entails the specification of achievable learning objectives
- involves the division of course content into small easily comprehensible interrelated unit

- leads to a change in the role of the teacher from disseminator of information to diagnostician, prescriber, motivator or resource partner.

World Health Organisation [WHO (1985)] defines self-learning materials as any learning resource that can be used by a learner without the presence of the teacher and does not preclude learning from other learners. According to the body, the development of self-learning material can be divided into the following stages

- The preparatory phase: This involves the collection of data that would serve as a baseline information for the planning, implementation and evaluation process
- Production phase: This entails the printing of text material, illustration, manufacturing of kits that form the self-learning materials/module package
- Dissemination phase: This denotes the dispatch of the self-learning materials to the user/learner after which the package will be assessed. The assessment is aimed at determining the degree to which the objectives of the materials in terms of learning outcomes have been achieved during and at the end of the learning programme

Oriazowanlan and Ummunna (2010) view self-regulated learning as an independent learning which is thought-provoking, adaptive, reflective and stimulating. The author posits that it is characterised by the awareness of thinking and using strategies and situated motivation to foster students' meta cognition in an achievement task. According to the authors, the traditional method of teaching and learning has not yielded the required expectation. The postulations of various scholars have shown the ineffectiveness of the tradition mode of teaching which places the teacher at a vantage position as disseminator of knowledge, skills and attitude with the learner playing passive role in the teaching-learning process. This situation has warranted the clamour for self-learning strategies which will allow the learner take responsibility for his or her learning thereby lending credence to the design and development of self-learning package in this study.

2.2.2 Instructional Puzzle

Puzzle according to The New Penguin English Dictionary (2000) is a problem, toy or device designed to testing one's ingenuity while the Cambridge Advance Learner's Dictionary (2008) defines puzzle as a game or toy in which you have to fit separate pieces together or a problem or questions which you have to answer by using skills or knowledge. It further posits it as, to think hard about something in order to understand it. The Longman Dictionary of Contemporary English (2005) defines puzzle as to confuse someone or make them slightly anxious because they do not understand something. It further views puzzle as a game or toy that has a lot of pieces that you have to solve.

The various definitions of puzzle show that it entails solving problems through critical reasoning. Phil (1995), while assessing the educational benefits of Sokoban Puzzles asserts that children enjoy thinking and one of the miracles of personal computer is that it helps young and old children develop an appetite for logic puzzle. To him, when a logic puzzle is inherently appealing, children will have an inner motivation to solve increasingly more difficult versions of that particular type of puzzle. He posits that Skoban Puzzle can help students develop visualisation and spatial reasoning skills. Michalewicz and Michalewicz (2007) state the criteria for good educational puzzle as generality, simplicity, eureka and entertaining factors. To them, puzzle based learning is driven by challenging - open minded problems, students work in small groups while the teacher takes the role of a facilitator. In their views, puzzle- based learning allows learning by experience, imitation and reflection.

Falkner, Soriamarthi and Michalewicz (2009) assert that puzzle based learning assists students by providing a framework to explore critical thinking as well as being fun and interesting. In their views, students have difficulties in independent thinking or problem solving skills regardless of the nature of the problems while educators are interested in teaching "thinking skill" rather than "teaching information and content". They posit that puzzle based learning approach aims at encouraging students to think critically about how to solve instructional problems, those not encountered at the end of some textbooks' chapter.

Scott (2002) defines puzzle as a problem that is fun to solve. Ann (2006) posits that parents and teachers often underestimated the effectiveness of puzzle in teaching skills and contents. The scholar asserts that there are many types of puzzle such as those that teach spatial skills, hand-eye coordinating, mathematics, language, social science and science concepts as well as logic and thinking. According to the scholar, children as young as one year can use simple puzzles since there are puzzles for all ages including adults. Ann (2006) submits that the best quality of puzzle is enjoyment experienced by the users as they solve them.

Ackert (2009) advocates using puzzle with children of all ages based on the experience as home tutor. To Ackert (2009), puzzles help in teaching colour, shape, letter and word recognition skills; sensory perception; fine motor skills such as grasping and manipulation of objects; hand-eye coordination; spatial reasoning; solving reasoning skills, principles of deduction; part to whole/whole to part understanding; sorting and classifying; organisation skills; self-confidence; the value of patience and determination; social skills/cooperative play. Ackert (2009) concludes that the use of puzzle throughout a child's educational years will benefit him/her in all subject areas and every area of a child's life will benefit from the use of puzzle. Therefore the scholar

suggests that a parent (or an educator) should begin using puzzles when the child is a toddler and can begin to grasp/manipulate objects.

The relevance of puzzles in terms of developing critical thinking ability in learners, making learning interactive and fun, make the determination of the effects of self-learning instructional puzzles on learning outcomes and retention a worthwhile effort.

2.2.3 Computer in Education

Computer technology has turned the world into a global village and, its success in other sectors of our national life has made the incorporation into education a necessity. According to Tyack and Cuban (2000), computer and telecommunication technologies will have a significant impact on teaching for this generation of teachers not only because of their pervasiveness in other aspects of human lives, but due to their advantages over other educational tools. In the view of the scholars, computer and related technologies can be powerful teaching and learning tools when handled by teachers who know how to integrate them appropriately into the day-to-day interaction with their students.

Kimberlee (2010) views computer-based learning in education as using computer as centre part of educational experience. According to the study, children who received early intervention including computer-based strategy improved in their early reading skills. Mudashiru and Adedeji (2010) in their finding reveal that students exposed to Computer Assisted Instruction either individually or cooperatively performed better than their counterparts exposed to convectional classroom intervention. Trentin (1996) posits that there has been a strong argument that the use of computer for instructional purposes increases motivation in children.

The findings of Howland, Laffety and Espinosa (1997) show that children exposed to computer-based instructional strategy were highly motivated to complete their assignment and demonstrated high level of curiosity, achievement orientation and personal ownership of the project. Lawal and Abdullahi (2002) state that computer is an ideal resource for simulation of science experiment, modeling in Economics, graphics in Arts and Design, and assessing a large database in Geography, History and Geology. Sewell (1990) Citing Sloman (1978) refers to computer as perhaps the most complex toy ever created by man. David (1990) citing Chandle (1984) defines micro-computer as a tool of awesome potency which is as richly interactive as a musical instrument. The scholar also asserts the potency of computer in education in the area of allowing individualisation of instruction and interactivity which promotes active learning.

According to Ajelabi (2005), teachers should help the learners develop their collaborative learning skills, critical thinking skills and moral character through the use of micro-computer in

particular and new technologies in general. Ajelabi (2005) presents the Wittich and Schuller (1978) modes of Computer Assisted Instruction which are; drills and practice, tutorial, simulation and games, modeling and information seeking. Akintude (2004) cited in Akinseye (2008) defines Computer Assisted Instruction as the use of computers as learning resources. To Akinseye (2008), the teacher is substituted as the learner interacts directly with the medium of instruction through the available input terminal. Citing Abdulsalam (1997), the scholar states that Computer Assisted Learning methods include drill and practice, tutorials, simulation, games and problem solving.

Social studies scholars have also advocated for technology integration into social studies classroom via computer-based instructional strategy. Adeyemi (2012), posits that development across the world has necessitated changes in educational goals that will not limit the responsibility of the school to equipping the learners with basic content in social studies curriculum but should also inculcate practical skills that are capable of fostering self-development and continuous learning thereby recommending the adoption of Computer Assisted Instructional strategy in social studies. Adeyemi (2012) citing Cooper (1973) to justify the need for computer-based instructional strategy in social studies identifies the demerits of conventional method of instruction in terms of; unspecified or vague objectives, teacher centredness, provision of critical information in lecture form, setting of equal pace for all students, irregular evaluation, delayed feedback amongst others.

Achor and Shaibu (2013) while advocating the incorporation of computer-based instructional strategy in social studies classroom assert that social studies aims at producing students who will be responsible and responsive in terms of contributing towards the growth and development of their immediate community. However, Achor and Shaibu (2013) note that the expected transformation of the society through social studies is still farfetched based on the utilisation of inappropriate instructional strategy in the classroom. The scholars therefore suggest the adoption of strategies which are in line with modern technology and also make the subject easy to learn and assimilate. In the view of Ojobo (2011), the essence of social studies is to develop sound values and attitude in the learner which can only be achieved through participatory, demonstrative and experiential engagements of the learners in the teaching-learning process.

The views of the above scholars imply that the use of computer in the teaching-learning process is necessary and relevant in order to make learning a social and active process so as to facilitate learning and enhance retention of what is learnt. However, the utilisation of computer-based self-learning instructional puzzle has not received the required attention among researchers in the field of social studies.

2.2.4 Meaning and Factors Affecting Retention

Retention, according to Macmillan English Dictionary for Adv;anced Learners, is the ability to remember ideals or facts. The American Heritage Dictionary (2007) defines retention as the ability to recall or recognise what has been learned or experienced. According to Stephen (1991), students must retain information from classroom in order to benefit from the learning. Stephen posits that the amount of retention will be directly affected by the degree of original learning. The scholar states that if the participants did not learn the materials well initially, they will not retain it well either. To Stephen (1991), retention is directly affected by the amount of practice during learning and therefore suggests that instructors should emphasise retention through application and practice after the demonstration of the desired performance. Good and Brophy (1986) conclude that practice or rehearsal improves retention thereby advocating distributed practice rather than mass practice. According to these researchers, the more deeply a word is processed, the better it will be remembered. Oladele (2004) posits that for learning to take place, learners must be actively involved in the learning process; they must accept major responsibility for their learning and must be allowed to work in a threat free atmosphere.

Edwin (2010) states that to enhance learning, a living atmosphere must be created, learners should be able to work in their pace and must be able to practice since practice helps to increase the learning ability of a child. In the view of Owuamanam and Owuamanam (2004), minimal level of anxiety, cues, feedback are needed for effective learning. Ajelabi (2005) identifies readiness, motivation, practice, provision for transfer and creating convenient learning environment as factors that can aid learning. Adeyanju (2000) while looking into ways of enhancing learning identifies factors such as motivation, statement of objectives, organisation of content, preparation and use of instructional materials, practice and repetition, feedback, reinforcement and application.

Falaye (2005) asserts that the provision of feedback either immediately or delayed is better than no provision based on the view that feedback plays a significant role in the teaching-learning process since the knowledge of the performance helps in correcting mistakes and allows for improvement in subsequent learning task. The author acknowledges the significant role of delayed feedback in determining the extent to which retention has taken place. Hagnie (2007) posits that delayed retention is relevant in learning because it reveals the information and concepts that the student still knows three or more weeks after the effect of cramming for test has evaporated while Dougal (2011) posits that retention could be measured a week after the conduct of the immediate posttest. Dougal (2011) therefore examines retention by comparing the results obtained from pre, post and one-week posttests conducted after exposing the learners to three different methods of

teaching. Ramsey (1996) submits that retention can be measure two weeks after the conduct of the initial test. The scholar therefore measured retention by comparing the results of test conducted two weeks after the measure of original learning carried out immediately after instruction.

The studies of Ramsey (1996), Hagnie (2007) and Dougal (2011) reveal that retention could be measured as from a week after the conduct of an initial test. Dale (2011) shows that learning retention rate is influenced by the learning experiences and the media. Dale (2011) further reveals that practice by doing method enhances knowledge retention up to a level of 75%.

The incorporation of features such as repetition, activity, motivation, feedback certain level of anxiety in the computer-based self-learning instructional package make the investigation of its effect on learning outcomes and retention relevant since these features could be motivating factors for learners to learn. The conduct of delayed test two weeks after the posttest has found credence in the conduct of delayed test to measure retention between one to three weeks after the conduct of the initial posttest by researchers.

2.2.5 Concept of Cognitive Style and its Classification.

Cognitive style according to Martinsen and Kaufumann(1999) is consistent individual differences in ways people experience, organise and process information. Steele (2003) asserts that cognitive style refers to a person's preferred pattern of mental thinking as demonstrated over time. It deals with individual's preference for certain type of problems, strategies for solving problems and making decisions. In the view of Weimer (2008), cognitive style reflects individual's typical or habitual mode of problem solving, thinking, perceiving, remembering. According to Liu and Ginther (1999), cognitive style refers to the individual consistent and characteristics predisposition of perceiving, remembering, organising, processing, thinking and problem solving. Ormrod (2008) admits that students with the same intelligence level often approach classroom tasks and think about classroom topics differently which the scholar attributed to differences in cognitive style over which students don't necessarily have conscious control.

According to Huseyin and Gunes (2012), knowledge of the way students think and learn is critical in the design and application of educational system since it would enhance the achievement of the educational goals. In the view of Guven and Kurum (2006), knowledge of how individuals think and learn along with elements that affect these processes will ease the effectiveness of the learning process. Cesur and Fer (2009) view learning style as a method that the individuals has come to get used to for acquiring, processing and storing new information and

skills. Dunn and Dunn (2002) posit that the determination of an individual learning style and arranging learning medium in line with it will increase academic success.

Cognitive style is static in every individual and has effect on whatever one does since individual with different cognitive styles will approach issues and problems differently. Cognitive style is of different dimensions based on the classification by various authors. Ormrod acknowledges two dimensions of cognitive style which are analytic versus holistic processing and verbal versus visual learning. Liu and Ginther (1999) identify the following dimensions of cognitive style based on various authors.

(i) Cognitive complexity versus cognitive simplicity (Kelly,1955)
(ii) Deep elaborative versus shallow reiterative (Schmeck, 1983)
(iii) Field dependence versus field independence (Witkin,1962)
(iv) Global versus analytical (Kirby,1988)
(v) Impulsive versus reflectivity (Kogan, 1965)
(vi) Leveler versus sharpener (Holzman and Klein,1964)
(vii) Objective versus non-objective (Leihwood and Montgomery,1982)
(viii) Organiser versus non-organiser (Atman, 1988)
(ix) Right versus left-brain (Torrance and Rockenstein 1988)
(x) Risk taking versus cautiousness (Kogan and Wallach,1964, Kogan, 1971)
(xi) Scanning versus focusing (Gardner,1961)
(xii) Sensitisers versus repressors (Bergouist, Lioyd and Johansson,1973)
(xiii) Simultaneous versus successive (Das,1988)
(xiv) Verbaliser versus imager (Riding and Taylor, 1976)
(xv) Verbaliser versus visualiser (Richardson,1977)
(xvi) Visual versus haptic perceptual type (Lewenfeld, 1945)
(xvii) Holistic versus serialist (Pask,1972)

This study is based on Witkin's classification into field dependent and field independent. Witkin, Moore, Goodenough and Cox (1977) posit that a field independent person tends to be intrinsically motivated and enjoys individualised learning while field dependent ones tend to be extrinsically motivated and enjoy cooperative learning. Antonietti and Gioletta (1995) state that field independent participants are more likely to be analogical solvers than field dependent participants. In the view of Parcels (2008), field dependent and field independent are contrasting ways of processing information. The relevance of Witkin's classification of cognitive style in terms of learner preference for information dissemination and processing strategies makes the choice relevant in this study.

2.2.6 Methods of Teaching Social Studies

Ikwumelu (2009) asserts that social studies in addition to specific content and objectives has instructional methodologies suitable for its instruction based on the ideas propounded by the great educationists and philosophers of old. He identifies lecture, dramatisation, problem-solving, games and simulation, brain storming, inquiry, questioning, debate, panel, discussion, devil's advocate, field trip, project, construction, creative activity as the various methods of teaching social studies. The author posits that quizzes, puzzles, work cards are subsets of problem-solving method which could be employed in instructional delivery in social studies classroom.

In the work of Mezieobi, Fubara and Mezieobi (2008), social studies methods include presentation/expository, class teaching/transmission, inquiry, problem-solving, simulation, discussion, dramatization, creativity, construction, and questioning methods. According to the scholars, quizzes, puzzles, sorting and work-cards constitute problem-solving methods in social studies. The National Teachers' Institute (2000) identifies presentation, construction, creative activity, dramatisation, simulation and game, inquiry, discussion, problem-solving, project as the various methods of instruction in social studies with the identification of quizzes, puzzles, cartoons and work cards as strategies under problem-solving method.

Ajelabi (2005) on a general platform identifies some teaching methods and techniques amongst which are lecture, discussion, demonstration, discovery, project, problem solving, field trip, team teaching, micro teaching, questioning and peer teaching techniques. Dada (1999) posits lecture, socratic, discovery, project, simulation and play as problem-solving methods of teaching. In the view of Ajiboye, Adu and Amosun (2005) methods of teaching social studies can be classified into traditional which incorporate lecture, discussion, inquiry, project, problems-solving and questioning methods while the modern methods consist of enter-educate, resource person, case study, concept mapping, programming, self-learning instruction, value classification strategies, games and role playing methods. According to the scholars, programmed/self-learning instruction, value clarification strategies and games/role playing emanated from effort towards individualised learning and instruction. The National Policy on Education (2004) recommends the adoption of technological-based instructional strategies in social studies classroom through the use of video clip in instructional delivery in social studies.

Social studies scholars have asserted the need to bring interactivity into social studies classroom through different strategies. Abdu-Raheem (2011) recommends the use of discussion method in social studies classroom, Adeyemi (2008) advocates the adoption of cooperative learning and problem-solving strategies, Odor and Igwe (2012) suggest the use of video-tape

instruction while Adeyemi and Ajibade (2011) support the use of simulation games and brainstorming strategies.

The identification of problem-solving, self-learning and technological-based learning strategies of instruction in social studies by the various scholars shows the need to design, develop and determine the effects of computer-based self-learning instructional puzzles on students' learning outcomes and retention in social studies as focused in this study.

2.2.7 Students and the Use of Electronic Media

The prevalence of electronic media in modern society has led to high level of attachment to them by students. According to Nelson (2011), most children spend a lot of time learning from the television though what they learn may not be in line with the expectations of parents and adult. Prensky (2001) views students of recent time as representation of the first generation to grow up with new technology based on the fact that they have spent their entire lives surrounded by technology thereby using computers, videogames, digital music players, video camera, cell phones, and all other toys and tools of digital age.

Prensky (2001) regards students of this age as "digital native", premised on the fact that an average college graduate has spent less than 5,000 hours of their lives reading but over 10,000 hours playing games and 20,000 hours watching television. The author therefore suggests the combination of technology with educational content across discipline. In the submission of Becker (2000), students are generally on task and express positive feeling when they use computer than when they are given other tasks to do. Singh (2009) when looking into computer in education reveals the commitment of students to new technology and submits that technology had been with the children since birth with computer as an integral part of a child's life and personality. Munoz (2007) reveals children's commitment to interacting with home personal computer in their toddler years while Solarin (2009) asserts positive disposition of Nigerian youth towards watching cartoons.

The above findings show that students of nowadays are committed to electronic media. Therefore, to achieve educational goal, educators and curriculum planners should see to the use of electronic media in instructional delivery in order to be in line with what the learners like doing. This study therefore investigated the effects of computer-based self-learning instructional puzzles on students' academic achievement and retention in social studies at Junior Secondary School level.

2.3 Empirical Studies

2.3.1 Instructional Puzzles and Students' Attitude to Social Studies

Attitude, according to Adebule and Aborisade (2013) is an effective variables that are of paramount importance for the well-being of an individual and the society, the authors posit that individuals are bound to acquire the right type of attitude toward self, work, other people and events. In the view of Ma and Kushor (1997), attidude is one of the variables that determine achievement. Citing Borabi (1990), Adebule and Aborisade (2013) assert that perception, attitude and expectation of students regarding mathematics and mathematics teaching are very significant factors that could influence students' achievement in mathematics. Since social studies is also one of the subjects in the school curriculum, students' attitude to the subject could be a major determinant of their academic performance.

In the view of Kaya (2011), attitude is the learnt tendency forcing individuals to exhibit particular behaviour against some particular people, object or condition. Kaya therefore submits that the formation of appropriate teaching experience and achievement of desired behaviour change cannot be accomplished in an atmosphere where students' attitudes are ignored in the learning process. This position is in line with that of Ulgen (1996) who submits that the attitude of a student will help the teacher determine what will lead to improved positive attitude towards the lesson and how to change negative attitude to positive. The findings of Dermirkanya and Anbas (2004) as cited by Kaya (2011) reveal negative attitude of students toward social science education due to lack of proper utilisation of technological tools and devices by the teacher. Lilian (2012) citing Fishdein and Ajzen (1975) based on value-expectancy model states that a person's attitude determines his or her behaviour which could automatically affect the outcomes. Lilian (2012) submits that a person would hold certain attitude towards an object by evaluating it which in turn enables the person to decide whether to hold a favourable or unfavourable view towards it thereby determining the person's intention to engage in various behaviour with regards to the particular object which could have served as a significant predictor of the final outcome. Premised on this, the scholar concludes that there is a general consensus that attitude would be regarded as a significant predictor of students' academic achievement.

Scholars have noted that, the use of conventional method of teaching in social studies has led to ineffective learning and poor attitude towards the subject. Awad and Fikry (2013) assert that students who study at various learning stages are favourably disposed to interesting methods which are interactive coupled with excitement and fun thereby implying students' positive attitude to instructional puzzles as they are interesting and interactive. Michalewicz and Michalewicz (2007) found students' positive disposition to instructional puzzles due to the attributes enshrined

in puzzles in terms of being engaging, thought-provoking and entertaining. The significant place of learners' attitude in the determination of academic achievement and the fact that scholars have identified poor attitude of students towards social studies premised on the dominance of conventional method of instruction necessitated the choice of students' attitude as one of the variables examined in this study.

2.3.2 Instructional Puzzles and Students' Academic Achievement in Social Studies

The efficacy of instructional puzzles in the teaching-learning process has been established by a lot of researches. In the view of Edge (2011), puzzles have long being a favourite of kids, moms and educators. The scholar therefore posits that the exposure of children to variety of puzzles would enhance their early childhood educational experience at home and in school by developing their cognitive skill, fine motor skill, hand-eye coordination and social skills.

The findings of Rubinstein, Dhotble and Ferenchick (2009) show that puzzles can facilitate learning in a relaxed environment. The researchers found the effectiveness of puzzles in the development of medical students' overall understanding of electrocardiogram and subsequently improve their interpretation skills. Coulter (2003) finds the effectiveness of puzzles through online Mathematics puzzles. The results of the investigation revealed that the use of online puzzles built cohesive social environment, promoted academic skill development, enhanced the desire to persevere in facing challenges and significant improvement in standardised test scores. The study of Kaka (2008) on the use of puzzle in chemistry classroom reveals the efficacy in promoting academic achievement.

The study conducted by Saxena, Nesbitt, Pahwa and Mills (2009) also lays credence to the effectiveness of puzzles. Awad and Fikry's (2013) investigation shows significant effect of instructional puzzles on vocabulary development of learners. The result shows that cross-word puzzles provide students with an opportunity to; think critically, collaborate, compete and discuss salient concepts using essential vocabulary associated with the concept. Awad and Friky (2013) posit that puzzles are wonderful tool for helping learners develop skills necessary for reading, writing and solving problems coupled with the retention of the learners' attention. Chen (2012) examined the effects of puzzle-based learning on students' achievement in arithmetic and found significant effect of the strategy on students' achievement and confidence in doing arithmetic and calculation. The study carried out by Alemi (2010) on improving students' vocabulary asserts significant effect of puzzles on students' achievement. The findings of Aremu and Ayelaagbe (1997) further attest to the efficacy of instructional puzzles in instructional delivery. The study carried out by Adedoja, Abidoye and Afolabi (2013) attests to the effectiveness of puzzles in

promoting students' achievement in social studies. Coulter (2003) concedes to the fact that puzzle can build the understanding of straight forward arithmetic concepts and complex ecosystem dynamics. In spite of the effectiveness of puzzle-based instruction, the utilisation is not prominent in the teaching-learning process particularly in social studies, most of the studies carried out on the effectiveness of instructional puzzles on students' academic achievement are not computer-based and therefore do not go in line with modern technology utilisation which is based on computer. This study therefore examined the effect of computer-based self-learning instructional puzzles on Junior Secondary School students' learning outcomes and retention in social studies.

2.3.3 Instructional Puzzles and Retention in Social Studies

The essence of social studies is to produce citizens that are responsible and responsive so as to contribute meaningfully to the growth and development of the society. The strategic role of social studies in the society requires learners to retain and transfer skills, knowledge and attitude acquired in social studies to address real life issues. According to Achor and Shaibu (2013), social studies is geared towards producing effective students who will in turn contribute to the growth and development of their immediate community. However, the authors' investigation shows non-realisation of the goals set for social studies due to the dominance of conventional instructional strategy in the classroom thereby necessitating the need to embrace technological based strategy such as computer-based self-learning instructional strategy that could make the subject easy to learn and assimilate. According to Falkner, Saorimarthi and Michalewicz (2009), puzzle-based learning provides opportunity for students to explore critical thinking. The study conducted by these scholars reveals consistent development of puzzle-solving skills which cumulated into excellent performance of the students in examination thereby reflecting the efficacy of instructional puzzle in improving retention

In the view of Oladele (2004), learning can effectively be facilitated through certain rules and principles which include; active participation of the learner in the learning process, learners' acceptance of major responsibility for learning, learning in a free atmosphere amongst others. The incorporation of all these elements in the computer-based self-learning instructional puzzles shows that puzzle could facilitate learning and retention. The study of Coulter (2003) reveals the efficacy of puzzle on students' ability to retain learnt material as the performance of the students exposed to puzzle-based learning in mathematics improved significantly in the examination conducted in the fall of the following year. Kaka (2008) confirms the efficacy of puzzle in enhancing retention as students exposed to puzzle were able to recall the knowledge gained after many months. The investigation carried out by Awad and Fikry (2013) on the long term effect of

puzzles on students' retention in vocabulary reveal significant effect of puzzles on retention which was attributed to the attribute inherent in puzzles in terms of the development of skills to read, write and solve problems.

2.3.4 Gender, Learning Outcomes and Retention in Social Studies

Gender will remain an important variable in the understanding of issues of politics and political participation, education, the environment, health, religion, cultural belief and value (Omololu, Olurode and Soyombo, 1999). According to these scholars, gender is a social interpretation of being male or female. That is, the social conception of the expectation and behaviour considered appropriate for those identified as male or female. According to them, gender is dynamic in the sense that its' identities change, are culture bound and is an important determinant of an individual experience in Nigeria.

Omololu, Olurode and Soyombo (1999) assert that the social conception of roles, expectations, opportunities and privileges attached to being a member of a particular sex is so strong that upon ascertaining the sex of a baby, it is always possible to predict the child's life changes. Females are believed to be fulfilled only in their role as wives and mothers which adversely affect their education. They assert that though, there are no discrimination rules on enrolment at schools based on gender but people's attitude, value and beliefs continue to influence the education of male and female with specific consequences such as the encouragement of boys to embrace subjects considered difficult such as Mathematics, Physics and Chemistry while girls are encouraged to embrace subjects in arts and social sciences.

Amoda (2008) citing Riley (1997) posits gender as the social and cultural conditions of being male or female. It centres on the role men and women play in the society. According to Amoda, gender influences all aspect of our lives, the education we receive, the social role we play and the power and authority we command. Awoniyi (2000) in his investigation on the performance of male and female candidates in six courses studied at College of Education, Lafiaji shows that females out-performed males in English Language while the opposite is the case in teaching practice. The study also reveals that male out-performed female in accounting and statistics but not in typewriting.

The study of boys' and girls' performance in GCE 'A' Level examination over four years by Brokin, Eccieston and Burrow (1990) shows that boys out-performed girls in all the 16 subjects studied except English Language and Literature in English. Mohammed (2000) submits that gender bias in education dates back to the colonial period when only a minority of upper and middle class females who obtained higher education concentrate in arts and humanities . The

study shows that the academic achievement of males is greater than that of females. Bello and Philip (2004) also find that females performed poorly in mathematics when compared with their male counterparts despite the efforts of the teachers. Zember and Blume (2009) ascertain gender difference in academic performance. The study carried out by Okereke, and Onwukwe (2011) reveal significant effect of gender on students' academic achievement.

Jekayinoluwa (2005) laments that the school and nation are making profound contributions to the creation of learning environment that is favourable to the boys which could be responsible for gender difference in learning outcomes and retention. According to Oludipe (2012), certain vocations and professions have traditionally been regarded as men's (medicine, engineering, architecture) and others such as (nursing, catering, typing, arts) as women's. To Oludipe (2012), typically, parents call boys to wash cars, cut grass, fix bulb and climb ladders to fix or remove things while girls are assigned into washing dishes, cooking amongst others. In a nutshell, boys are expected to handle complex and difficult tasks while girls are saddled with relatively easy and less demanding tasks. The above postulations reveal that males are orientated toward tasks that are perceived to be difficult while females are expected to be involved in tasks believed to be easy and less challenging which could imply choosing subjects and courses that are considered easy to pass in their academic endeavour. Adeosun (2002) reveals no significant difference in academic achievement based on gender but finds significant effect of gender on retention in social studies which could be attributed to more positive disposition of female to social studies than male students. Kolawole (2007) shows gender difference in academic performance when exposed to cooperative and competitive learning strategies with the boys performing significantly better than girls. However, Abdu-Raheem (2012) finds no significant effects of gender on learning outcomes and retention in social studies which is in line with the finding of Oludipe (2012). Chiodo (2004) asserts the postulations of many policy makers and elementary teachers who viewed social studies as "enrichment" or "second ranked" subject thereby influencing students' attitude to the subject.

The view held by teachers in respect of social studies as a subject in the school curriculum encourage the teachers to focus on superficial issues by giving high priority to facts instead of in-depth study of issues involved in social studies which by inference could have negative effect on students' learning outcomes and retention in social studies. Huseyin and Gunes (2012) find that students' attitude levels towards social studies is positive and high but degenerate as students proceed to higher classes which could be attributed to more comprehensive content and abstract topics. The authors further assert better female's attitude to social studies than male which runs

contrary to the findings of Guven (2008), Caliskan and Turan (2010) who find no significant difference between male and female students' attitude towards social studies courses.

The influence of gender on learning outcomes and retention as observed by various scholars therefore makes the examination of its influence on the dependent variables premised on the use of computer-based self-learning instructional puzzles relevant in this study.

2.3.5 Cognitive style, Learning Outcomes and Retention in Social Studies

Cognitive style is a learner's characteristic that has effect on learning outcomes since the way individuals perceive process, retain, experience, organise information and address problems vary. Dembo (1991) cited in Morrison and Frick (1994) states that field dependent persons are drawn to people, prefer academic areas such as social science that are more people oriented and are better at learning and remembering impersonal materials. Ige (1998) posits that most of the differences encountered in students' learning could be described in terms of different manner in which students perceive and analyse a stimulus while Ogundipe (2002) asserts that the understanding of individual learning style will to a great extent lead to reduction in teachers' and students' frustration. This submission implies that cognitive style will influence the choice of instructional strategy with the aim of facilitating learning and improve students' learning outcomes. Chou (2007) citing Schwartz and Hanson (1992) states that females preferred to learn mathematics through unconventional style which; fosters group consensus, encourages collaboration and contributes to constructing interrelationship of thoughts while males learnt through argument and individual activities which fosters independence and encourages competition. The implication of this postulation is that there is gender difference in how students receive and process information which could also be a determinant of students' learning outcomes and retention.

Ormrod(2008) asserts that cognitive style seems to influence how and what students learn. This assertion of Ormrod (2008) substantiates Tinajero and Paramo (1997) who identify cognitive style as a significant source of variation in overall performance of students in subject domains such as English Language, mathematics, natural sciences, social science, Spanish and Galician. The study of Morphy, Casey, Day and Young (1977) reveals the effects of cognitive style on academic achievement. The finding of Hall (2000) also asserts the significant effects of cognitive style on learning outcomes. Sara (2010) posits that there is a significant effect of cognitive style on students' attitude towards various school subjects. According to Sara (2010), field dependent students are better disposed to arts and social science subjects while field independent students prefer scientific and mechanical vocational areas. Sara (2010), citing

Yakassi (1991) states that field dependent students tend towards social studies which is the bedrock of artistic and social sciences while field independent students show high level of interest towards integrated science which is the bedrock of scientific and chemical career. The study further shows gender difference in cognitive style with male being more of field independent and female more of field dependent.

However, the study of Altun and Cakan (2006) which focused on undergraduate students' academic achievement based on field independence/dependence cognitive style finds no significant effect of cognitive style on academic achievement. So also, Morrison and Frick (1994) find no significant effect of cognitive style on academic achievement but stress the fact that the field independent learners in their study found the multimedia module easy to use and were excited using it. The findings of Chou (2007) reveal significant effect of cognitive style on learning outcomes with the field independent students on the higher side but the interaction effect of cognitive style and gender as well as the three-way interaction effect of treatment, cognitive style and gender was not significant.

The above postulations based on the findings of different scholars make the examination of the effect of cognitive style appropriate in this study since it has influence on learners' preference for instructional strategy which could also affect their academic achievement, attitude towards school subjects and ability to retain the content of the topics learnt.

2.3.6 Students' Attitude towards Reading

Reading culture has been identified as one of the problems facing students in Nigeria. Obafemi (2006) attributes poor reading culture among Nigerians to poor economy which has made reading expensive based on the cost of textbooks. However, he was quick to identify that people prefer to stay in their homes and watch videos.

Harold (2001) stipulates that lack of good reading habit among Nigerians has become a great challenge to publishers. Nwachukwu (2009) decries poor attitude towards reading among Nigerian students. To him, film shows and home videos watched virtually in every home has hindered students from performing well in examinations and robbed them of the zeal to make proper use of library. The submission of Nwachukwu (2009) implies that poor attitudes to reading may not be exclusively based on poverty but on attitude and commitment to modern technology such as computer and video.

Ifedili (2009) posits that there is a declined in the reading culture among the students in tertiary institutions. According to the scholar, 60 percent of the students read prescribed textbooks only during examination period while browsing and watching television have taken most of their

time for reading, only 21 per cent of students buy novels to read for knowledge and pleasure. Adeniji's (2010) investigation shows that some primary school pupils find it difficult to read and understand despite the fact that reading is indispensable. According to the scholar, some pupils exhibit care free attitude towards reading. Oyetunde and Unoh (1986) cited in Adeniji (2010) list impediments such as lack of materials, poor preparation of teachers, lack of interest, poor library or lack of library, home background and lack of adult readers as models to reading among Nigerian students.

Chukwuemeka (1998) cited in Jegede (2010) attributes failure to read to people's attitude towards book. To him, Nigeria does not have a reading culture since our ancestors had oral tradition. The author posits that a change from oral to book culture would require a process of sustained conditioning to open up the consciousness to appreciate the indispensability of book lovers.

The views and findings of various scholars in relation to students' attitude towards reading revealed that there is general poor reading habit among Nigerian students while their disposition to watching video and browsing is high which could be attributed to relaxation, fun and interactivity inherent in them. It is therefore incumbent on stakeholders to incorporate teaching strategies that will allow for learning in a relaxed atmosphere with element of fun and interactivity. These types of strategies could incorporate amongst others the use of computer-based self-learning instructional puzzles for instruction.

2.4 Appraisal of Literature

The prevalence of conventional instructional method in social studies classroom has been alluded to through researches despite its effects on short time memory, overstressing of students' attention time and boredom. Studies have also revealed the effectiveness of computer in instructional delivery based on the attributes in terms of active involvement of the learners in the teaching-learning process, immediate knowledge of result, opportunity to practice and revise information the way it was initially presented and therefore has been a singular tool that has led to the transformation of entire world outlook. However, its integration in social studies classroom has not been given required attention. Evidences from studies have shown low level of technological integration in social studies classroom.

The use of puzzles in education has also been acknowledged based on researches but there is dearth of information on its incorporation into computer-based instructional package in spite of the fact that puzzles enhance the development of problem solving skills in students which is one of the reasons for the study of social studies. This study therefore integrated technology into

social studies classroom based on the use of computer-based puzzles with the view of enhancing learning outcomes and retention.

Studies have also revealed the unwillingness of students to read coupled with their attachment to social media and electronic devices particularly, computer related devices. Therefore, there is the need to develop instructional strategies that will go along with what students like doing so as to facilitate effective learning as examined in this study.

Scholars have researched into the effects of cognitive style and gender on learning outcomes but the results have always differed thereby making the examination of their effects on learning outcomes based on different learning strategies relevant. So also, while studies have been conducted on field dependent/independent cognitive style, attention has not been given to field neutral learners which this study incorporated. The presence of technological gender gap has also been ascertained thereby calling for the examination of the likely effects on students learning outcomes and retention based on the use of technologically based instructional strategy in social studies classroom.

CHAPTER THREE

METHODOLOGY

3.1 Research Design

The study was in two phases. The first was the design and development of computer-based self-learning instructional package while the second involved the determination of the effects of the computer-based self-learning instructional puzzles on students' learning outcomes and retention in social studies. This phase adopted pretest-posttest, quasi experimental delayed-test design

Phase One

The first phase involved the design and development of computer-based self-learning instructional puzzles in a bid to enhance students' attitude, achievement and retention in social studies premised on their commitment to computer-related devices.

Development of the Computer-based Self-learning Instructional Puzzles

The design and development of the package was guided by the Computer-based Self-learning Instructional Package Model designed for the study. The computer-based self-learning instructional puzzle addresses three themes in the social studies curriculum for JS II. The themes are science, technology and society as well as storage and national economy. The themes were subdivided into four modules in the package based on the objectives and content stipulated under each of the themes. The development of the package was based on the following stages.

Stage I: Objective

This looks into the expected performance objectives based on each of the themes incorporated in the package. The objectives derived from the curriculum were incorporated into the objective menu of the package. The incorporation was aimed at ensuring that the learners are focused in the process of interacting with the package. The learners were informed to click on the objective menu and read the information provided to be aware of the expected behaviour after working on the package.

Stage II: Content

This focuses on the information to be disseminated to the learners towards the achievement of the stipulated objectives. The content is derived from the curriculum and recommended textbooks for the subject. The researcher also sought more information through the internet in order to enrich the content. Relevant pictures that could help in attracting and sustaining the attention of the learners so as to achieve the stipulated objectives were incorporated.

Each of the modules has content menu which students are to click and read the information provided before solving the puzzle. The content of each module was also structured in question format for the students to respond to when solving the puzzle.

Stage III: Relative Advantage

This has to do with the envisaged instructional benefits of the package over the conventional mode of instruction, the dominant method of instruction in social studies classroom. The package is expected to induce active learning thereby making the learners responsible for their learning. It is also expected to address the problem of boredom associated with the conventional method based on the fact that the puzzles entail elements of fun and interactivity.

The package is imbued with formative evaluation and reinforcement. The learner is applauded electronically for giving correct response to each question in the puzzle and is able to move to the next item. Hint menu is also provided to guide the students towards the correct response when unable to solve a question at first attempt. Solution menu is also provided for students to check the answer when unable to solve a question after the second attempt. This provision aimed at preventing frustration that could be associated with the conventional method where the students have to wait for response from the teacher when unable to solve a problem while such response may not come immediately thereby leading to frustration.

The electronic nature of the package also reflects the drive to induce learning through what the students like doing in terms of their attachment to social media and computer related devices.

Stage IV: Develop Prototype

The prototype was developed in three stages:

Stage1: The prototype at this stage contained the instruction on how to work on the package, the behavioural objectives and the puzzle tasks. There was no separate content aside from the one incorporated in the puzzle in question format. This prototype was trial-tested, the students exposed to it found it difficult to solve. The students suggested the need to have prior knowledge of the content before their exposure to solving the puzzle. The same prototype was shown to three lecturers in educational technology who raised questions concerning the essence of the package in relation to whether it is for enrichment, tutorial or direct teaching, the need for separate content menu to familiarise the students with the content before solving the puzzle was recommended since the package is a self-learning instructional package.

Stage 2: The content menu was incorporated into the puzzle based on information from the recommended textbooks on the subject. The content was presented in the form of normal note given to students in conventional teaching strategy. The prototype was shown to the subject teacher and trial tested again. The students were able to solve the puzzle better than those that

worked on the package before the incorporation of the separate content menu. However, the boredom associated with the conventional method of instruction in terms of dependency on note given was observed. The same prototype was shown to lecturers in educational technology who raised the need to fine-tune the content in a way that will be interactive and interesting coupled with relevant pictures.

Stage 3: The content of the package was modified and relevant pictures were incorporated into it before it was trial tested. The students that worked on it found it interesting to read the content and work on the package. The package was given to two social studies teachers for comments and they asserted the appropriateness of the package in terms the presentation of the content, usage of language and ease of navigation.

The package was further shown to three social studies teachers in different schools to ascertain the content accuracy, appropriateness of the language used, sequence of the information provided and give relevant suggestions. The prototype was also given to lecturers in educational technology and computer science for observations and suggestions before the final package was produced.

Stage V: Entry Behaviour

This refers to the previous knowledge of the students that could assist in effective utilisation of the package. A learner that will work on it should be able to boot a computer system, drag and type letters on a computer, handle the mouse and use it in navigating on a computer system.

These requirements accounted for the choice of JS II students for the study based on the fact that computer studies is an aspect of the school curriculum at upper basic level and therefore, could have been exposed to theoretical and some practical aspects of computer for a session at JS I. However, the researcher also designed and administered a computer literacy questionnaire to the participants to assess their level of computer literacy and therefore determine their training requirements for effective interaction with the package.

Stage VI: Instructional Environment

This has to do with the availability of necessary infrastructural and social amenities for effective utilisation of the package. Since the package is an electronic one, there must be provision for power supply and functional computer laboratory for its utilisation. These accounted for the stipulation of availability of power supply and functional computer laboratory in schools used for the study.

Stage VII: Trial-test: This stage entails the validation and trial testing of the computer-based self-learning instructional package through the following steps.

a. **Subject content validation:** The draft of the content on the selected topics was given to three social studies teachers to assess the adequacy of the content and the depth of coverage as required in the curriculum for the subject, appropriateness in terms of sequencing and use of language. Observations and corrections made by the teachers were incorporated before transforming it into computer-based package.

b. **Computer expert validation:** The prototype of the package was given to two computer experts to go through to express their opinion in terms of typography, legibility and navigation of the instructional package. Their suggestions were also taken into consideration in the production of the final package.

c. **Educational technology expert validation**: The first prototype was without separate content aside what was incorporated in the real puzzle aspect of the package. The prototype was shown to three lecturers in educational technology to ascertain conformity with the acceptable standard in educational technology in terms of; simplicity, unity, emphasis, ease of navigation, appropriateness of the pictures and colours used in the package. The need for separate content page was suggested. The prototype was moderated based on suggestions and re-presented. The need to incorporate relevant pictures that could facilitate learning and sustain students' interest was also raised. Their recommendation was effected and the prototype was further presented to them. Their appraisal of the prototype was satisfactory before the final package was developed.

(d) One-to-one validation: This entails exposing students to work on the package on individual bases in the presence of the researcher. This validation was carried out in steps.

Step I: The first step was the trial-testing of the first prototype which was the prototype without separate content aside what was incorporated in the real puzzle aspect of the package. Five students were selected from a school not slated for the main study and exposed to the the package. The students found it difficult to solve the puzzle while the need for separate content menu was raised by the students.

Step II: The second stage was carried out after the provision for separate content menu in the package as a result of the first trial-testing. Another set of five students was selected to work on the package. The students read the content before working on the puzzle. None of them was able to complete all the questions within the stipulated time of 25 minutes on their first trial, but were all positively disposed to the use of the package. The same students were again exposed to the package and three of them were able to finish within the stipulated time. Premised on this, the time stipulated for working on the package was increased to 30 minutes based on suggestion from the students.

(e) **Small group validation:** This stage involves exposing a group of students who shared the same characteristics with the target group but were not included in the main study to work on the package for a period of two weeks. This was also carried out in steps.

Step I: Ten students were randomly selected from a school not part of the main study to work on the package for two weeks under the supervision of the researcher. The students were able to work on the package satisfactorily.

Step II: In order to evaluate the package in terms of: functionality and navigation, content and graphic, usability and interest towards the usage, 25 students were randomly selected from two schools made up of private and public schools that were not used for the main study to work on the package for two weeks. The students and the teachers were trained on how to use the package after which the students were allowed to work on it under the supervision of the teacher while the researcher observed them. The Instructional Package Evaluation Questionnaire (IPEQ) was administered to them at the end of the two weeks to determine the appropriateness of the package in terms of; functionality and navigation, content and graphic, and usability.

Stage VIII: Develop Final Product

The final product was developed based on suggestions by educational technologists, social studies teachers at JS level, students on which it was trial-tested and problems identified in the process of the trial-test. The final product contains menu for introduction to the package, instruction on how to work on the package, performance objectives, content, the puzzle, hint and solution as explained below

(i) **The introduction menu**: This introduces the learner to the package. It states the topic in a package, duration of the lesson and instructs the learner to read the objectives for the lesson and content before working on the puzzle. The essence of this menu is to give the learner a mindset and prepare him/her for the task ahead.

(ii) **The objective menu**: This contains the behavioural objectives for the lesson as stated in the curriculum. The essence of this menu is to motivate the learner and focus his/her attention on expectations from him/her after interacting with the package

(iii) **The instruction menu**: This gives specific information on how to work on the package in relation to the filling of the grids, ascertaining the correctness of the learner's response to each of the items on the puzzle and searching for clue to correct response. The incorporation of this will enhance the usability of the package since it is a self-learning instructional package.

(iv) **The content menu**: This deals with the subject matter of the topic. It contains all the necessary information the learner is expected to acquire based on the behavioural

objectives of the lesson. Knowledge of the content will allow the learner to effectively solve the puzzle since he/she is expected to recall the information acquired in this menu while working on the puzzle.

(v) **The puzzle menu**: This is where the puzzle to be filled is displayed, it is a word puzzle and the grids are to be filled based on the correct answer to each of the questions raised. Each learner is expected to recall the information under the content in order to fill the grids.

(vi) **The hint menu**: This contains clue to the correct response to each question in each of the puzzles. The learner is expected to click on the hint menu when he/she cannot respond correctly to any of the questions in a puzzle to have an idea of the answer. However, a student is expected to click on the hint menu a second time if the correct response is not given after a second trial in the first puzzle for the display of the answer. The hint menu prevents the learners from been frustrated when unable to solve any of the questions while working on the puzzle.

(vii) **The solution menu**: This contains a complete solution to the puzzle. The learner is expected to click on the solution menu when unable to solve a question after checking the hint for the display of solution to the question. It also prevents frustration which could arise when unable to solve any of the questions. The learner is allowed to check the solution except in the first puzzle where the solution will be displayed at the expiration of the 30 minutes slated for the completion of the puzzle.

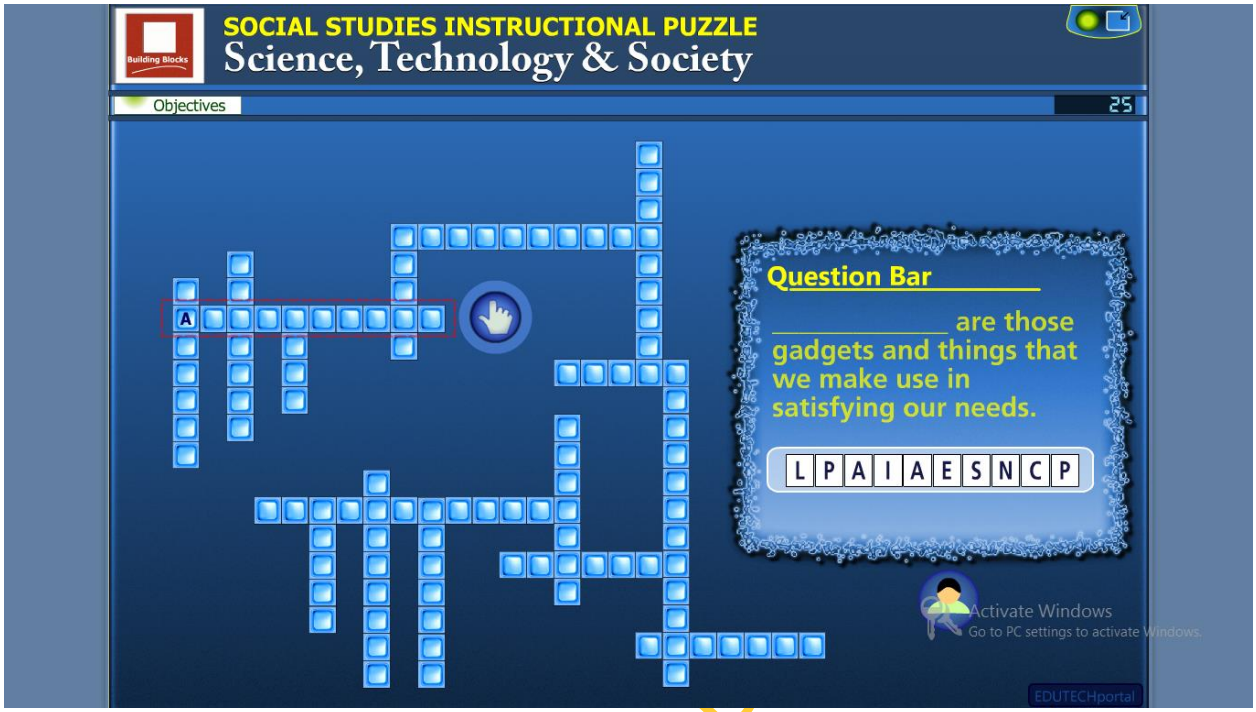
Stage IX: Evaluation

This is a common element in all the three models integrated for the development of the package. It deals with assessing the package and its effectiveness. The evaluation of the package started from the production of the prototype up to the point of trial-test. Suggestions and recommendations made by students, teachers and educational technologists were taken into consideration in producing the final package. However, the summative evaluation aimed at assessing the effects of the package on students' learning outcomes and retention was based on post-test and delayed–test conducted after the utilisation of the package by the participants.

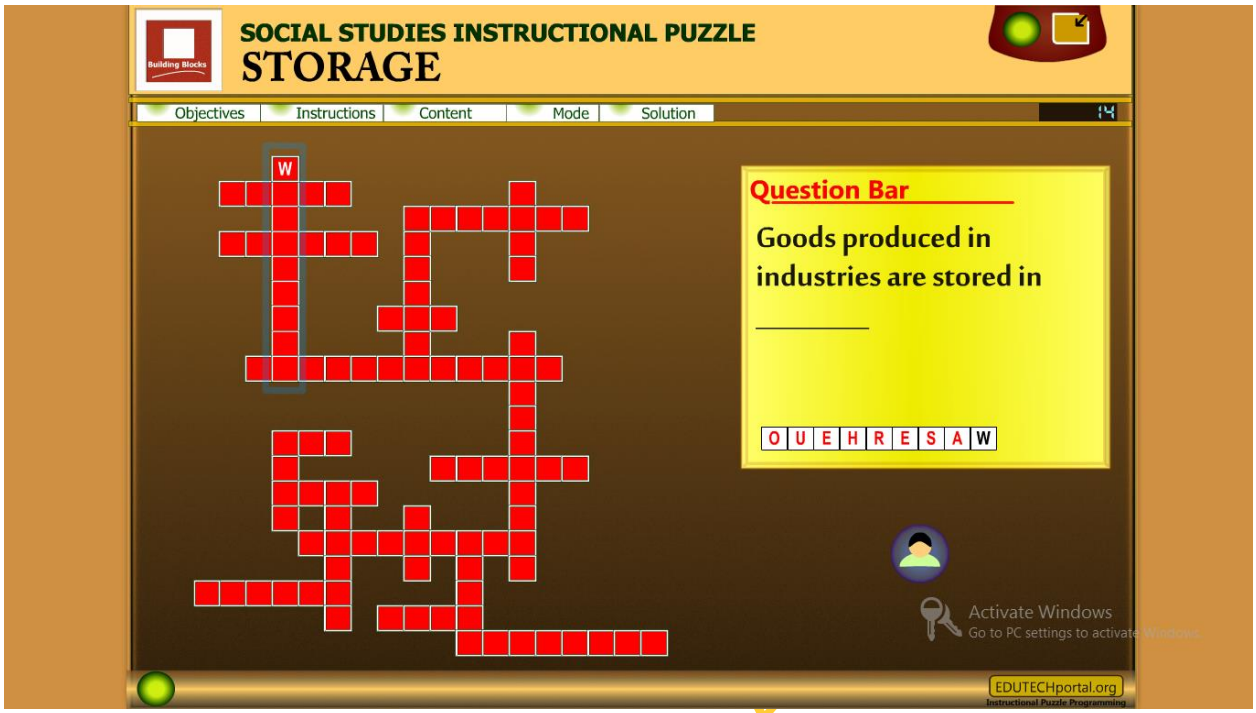
Table 3.1: SUMMARY OF THE ACTIVITIES IN THE DEVELOPMENT OF THE PUZZLES

STAGE	ELEMENT	ACTIVITY	REASON
I.	Objective	Statement of the behavioural objectives for each topic in the package.	To secure the attention of the learners and motivate them to learn.
II.	Content	Presentation of the content of each topic in the package.	To familiarise the learners with the required information based on the stated objectives for each topic.
III.	Relative advantage	Provision of hint menu, inbuilt formative evaluation and immediate knowledge of result.	To prevent frustration and enhance self-learning.
IV.	Develop prototype	1st - Prototype without separate content. 2nd - Prototype with separate content menu but without graphic. 3rd – Prototype with separate content menu and relevant graphic.	Inability to solve the first prototype due to lack of adequate information on the topic. Assumptions by students that the 1st prototype was like quiz led to the 2nd prototype. Suggestions from students, social studies teachers and educational technologists led to the development of the 3rd prototype.
V.	Entry behaviour	Selection of JS II and exposure of learners to computer literacy test.	JS II was selected because they would have been exposed to practical aspect of computer studies in JS I. The students' response to the computer questionnaire helped in determining the training requirement of the participants.
VI.	Instructional environment	Selection of schools with functional computer laboratory and power supply.	The package is computer based.
VII.	Test-trial	This was done in series. Serial I: Prototype without content. Serial II: Testing of prototype with content on 5 selected students twice. Serial III: Testing of the 3rd prototype after necessary adjustments have been made based on the earlier trials.	To make the package relevant for effective learning.
VIII.	Development of final product.	The final product contains: - Introduction menu - Objective menu - Instruction menu - Content menu - Puzzle menu - Hint menu - Solution menu	The information provided here is to enhance the usability and self-learning ability of the package.
IX.	Evaluation	This entails assessing the relevance of the package in terms of students' attitude, achievement and retention.	To assess the relevance of the package in learning.

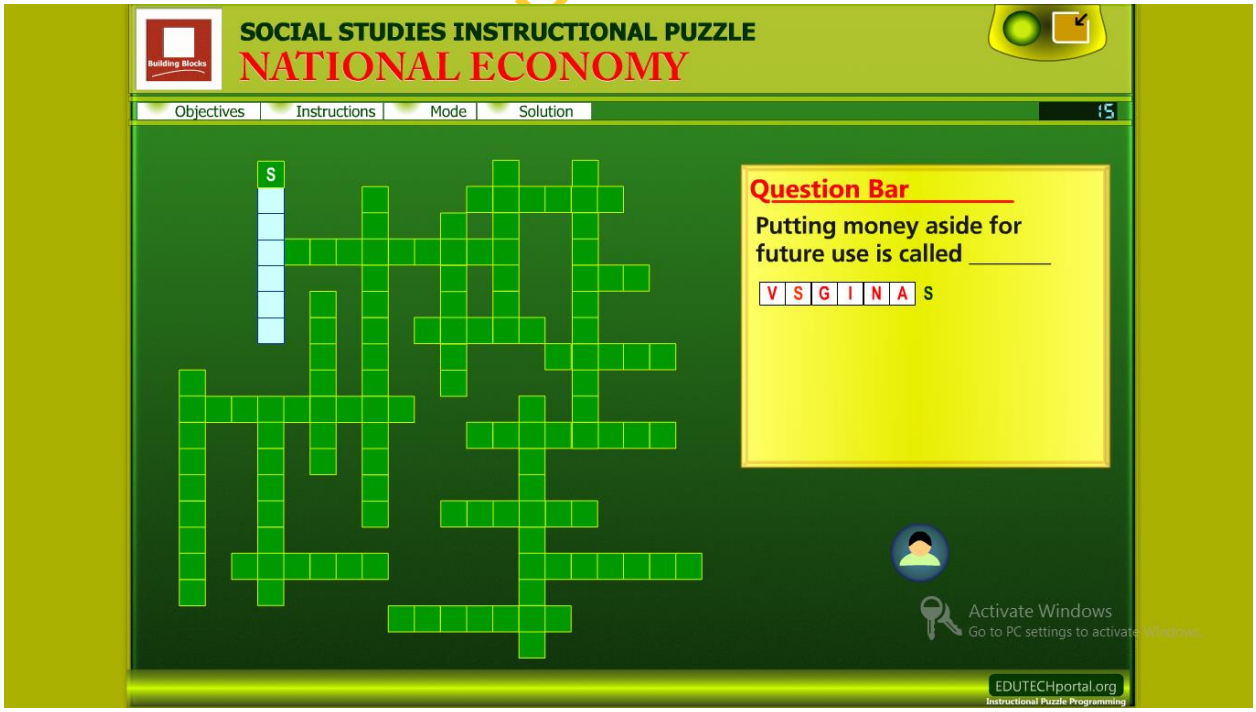
The 1st Puzzle



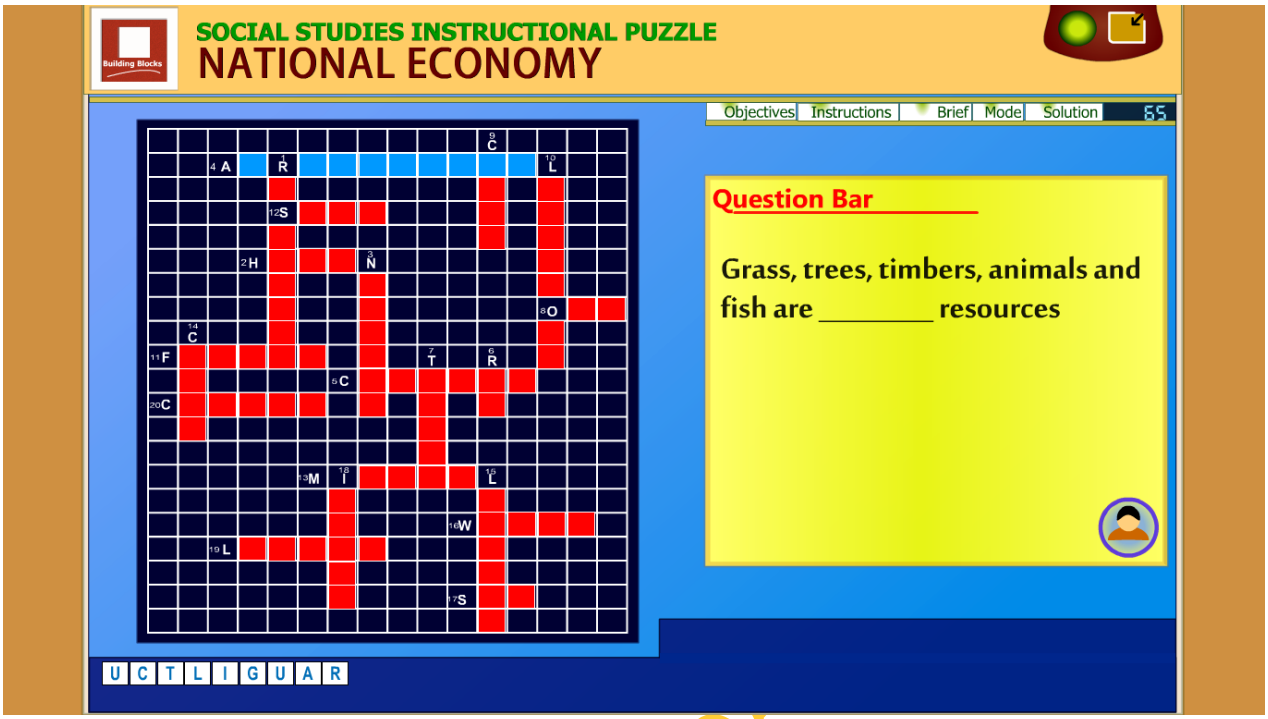
The 2nd Puzzle



The 3rd Puzzle



The 4th Puzzle



Phase Two

This phase deals with the determination of the effects of the computer-based self-learning instructional puzzles designed and developed in the first phase of the study. It also entails the research design for the phase, variables in the study, sample and sampling technique, research instruments, procedure for data collection and analysis.

The phase adopted pretest-posttest, control group quasi-experimental and delay research design. The schematic representation of the design is given below:

Experimental Group: O_1 x_1 O_3 O_5

Control Group: O_2 x_2 O_4 O_6

Where:

O_1 = Pre-test scores for experimental group

O_2 = Pre-test scores for the control group

x_1 = Treatment (computer-based puzzle)

x_2 = Conventional method

O_3 = Post-test scores for experimental group

O_4 = Post-test scores for control group

O_5 = Delayed-test scores for experimental group

O_6 = Delayed-test scores for control group

Table 3.2: 2 x 3 x 2 Factorial Matrix

Treatment	Gender	Cognitive style		
		Field Independent	Field Dependent	Field Mixed/Neutral
Experimental Group	Male			
	Female			
Control Group	Male			
	Female			

Table 3.2 shows that three major variables are involved in the study. These are; the independent variable, dependent variables and moderator variables. The independent variable is the treatment which is the instructional strategy manipulated at the level of computer-based self-leaning instructional strategy and conventional teaching strategy. The dependent variables are students' attitude, achievement and retention in social studies while the moderator variables are gender and cognitive style.

3.2 Variables in the Study

3.2.1 Independent variable

Instructional strategy at two levels

(i) Computer-based instructional puzzle

(ii) Conventional instructional strategy

3.2.2 Moderator Variables

(i) Gender at two levels (male and female)

(ii) Cognitive style at three levels (field independent/dependent/neutral)

3.2.3 Dependent Variables

(i) Students' attitude to social studies

(ii) Students' achievement in social studies

(iii) Students' retention in social studies

3.3 Selection of Participants

The population of the study is made up of all Junior Secondary II social studies students in Ilesa East and Ilesa West Local Government Areas (LGAs) of Osun State.

3.3.1 Sampling Technique and Sample Size

The study adopted purposive sampling technique in selecting schools within Ilesa East and Ilesa West LGAs of Osun State. The criteria for selection of schools are:

- Must have power supply
- Must have functional computer laboratory
- Must have a qualified social studies teacher
- Must be a co-educational school.

Intact class was used in each of the selected schools. The choice of JS II students was due to the fact that they have completed a session in Junior Secondary School 1 and have been exposed to basic practical aspect of computer studies based on computer studies at JS I and were not preparing for any immediate external examination like JS III students. A total of 141 participants took part in the study.

3.4 Research Instruments

Seven instruments were used in the study

i. Instructional Package Evaluation Questionnaire (IPEQ)
ii. Students' Attitude to Social Studies Questionnaire (SASSQ)
iii. Social Studies Achievement Test (SSAT)
iv. Cognitive Style Checklist (CSC)
v. Instructional Package Perception Questionnaire (IPPQ)
vi. Instructional Guide on Computer-based Instructional Strategy (IGCIS)
vii. Instructional Guide on Conventional Teaching Strategy (IGCTS)

3.4.1 Instructional Package Evaluation Questionnaire

Instructional Package Evaluation Questionnaire (IPEQ) was developed to assess the appropriateness of the package in terms of functionality and navigation, content and graphic coupled with usability assessment. The instrument was adapted from Oguntunde (2010) Multimedia Package Evaluation Checklist. The questionnaire is divided into four sections. Section 'A' contains 10 items based on the ease of working on the package in terms of moving from one

page to another, making use of the mouse. Section 'B' is made of 10 items on the information presented in the package in relation to the content and pictures. Section 'C' is also made up of 10 items which aimed at assessing the extent to which the package can be used by the targeted group while Section 'D' focuses on the assessment of the package by social studies teachers familiar with it. The items in the questionnaire are scored using 4, 3, 2 and 1. The draft was given to two lecturers in educational technology to assess the appropriateness. The instrument was administered to 10 students who were not part of the participants in the study but have been exposed to the package, the students' response was subjected to Cronbach alpha analysis and a reliability coefficient of 0.82 was obtained.

3.4.2 Students' Attitude to Social Studies Questionnaire (SASSQ)

The questionnaire addresses students' attitude to social studies. It is made up of 20 items placed alongside a four-point Likert Scale of Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD). The questionnaire was given to experienced social studies teachers and lecturers for face and content validity. It was further administered to 25 students who were not part of the study but shared the same characteristics with the participants. The response of the students was subjected to Cronbach alpha analysis and a reliability coefficient of 0.73 was obtained.

3.4.3 Social Studies Achievement Test (SSAT)

The instrument is made up of 50 multiple choice items based on three themes: science, technology and society as well as storage and national economy. The draft of the instrument was given to three experienced social studies teachers and lecturers for face and content validity. Based on their suggestion, some items were removed while others were modified to ensure face and content validity. The instrument was administered to 25 students in a school not involved in the main study, the scores from the test were subjected to Kuder-Richardson formula (KR 21) and reliability coefficient of 0.89 was obtained.

Table 3.3: Table of Specification for SSAT

Topic	Knowledge	Comprehension	Application	Total
Home appliances	3 (1, 6, 13)	6 (2, 3, 5, 7, 12, 15)	5 (4, 8, 9, 10, 11)	14
Storage	3 (14, 16, 49)	4 (18, 21, 22, 50)	5 (17, 19, 20, 45, 48)	12
Savings	4 (24, 25, 46, 47)	5 (26, 27, 28, 43, 44)	3 (23, 29, 30)	12
Resources	4 (31, 34, 35, 38)	5 (33, 37, 40, 41, 42)	3 (32, 36, 39)	12
Total	14	20	16	50

3.4.4 Cognitive Style Checklist (CSC)

The instrument was used to categorise the participants into field independent, dependent and neutral. It consists 12 items based on the modified form of Wyss (2002) checklist with each having "a" and "b". Participants are expected to choose options that best describe them. A participant that chooses up to eight option "a" is regarded as field independent while those with up to eight "b" are regarded as field dependent while those who do not fall within the stipulated conditions are field neutral.

3.4.5 Instructional Package Perception Questionnaire (IPPQ)

This instrument was used to assess the perception of students in the experimental group in terms of the perceived usefulness and perceived ease of use of the package. The instrument is made up of two sections with eight items each on perceived usefulness and perceived ease of use of the package by JS11 social studies students. The instrument is a modified version of Adedoja Adelore, Egbokhare and Oluleye (2013) Educational Radio and Mobile Device Acceptance Questionnaire based on Technology Acceptance Model. The instrument was administered to 20 students who were not part of the participants in the study but have been exposed to the package, their response was subjected to Cronbach alpha analysis and a reliability coefficient of 0.84 was obtained.

3.4.6 Instructional Guide on Computer-based Instructional Strategy (IGCIS)

This instrument was designed to guide the teachers in the experimental group on their expected role based on the design of the study as a self-learning package thereby limiting their role to that of moderator. The teachers' role was limited to making preparation for the use of the computer laboratory, allotting the learners to computer system and monitoring the students to ensure they work on the package.

The operational guideline was given to experienced social studies teachers and lecturers for face and content validity. Their observations and suggestions were taken into consideration to improve the quality of the instrument.

3.4.7 Instructional Guide on Conventional Teaching Strategy (IGCTS)

This instrument was designed to guide the teachers in the control group. The lesson note on each topic was prepared by the researcher with focus on the behavioural objectives, presentation of content with the use of relevant instructional materials prepared by the researcher based on the same information incorporated in the package for the experimental groups and evaluation. The guide was also given to experienced social studies teachers and lectures for face and content validity. Observations and suggestions made were incorporated to improve the quality of the instrument. The draft of the operational guidelines was given to experienced teachers and lecturers for necessary corrections and suggestions before the final copy was made.

3.5 Research Procedures

The researcher made use of the regular subject teachers in administering the treatment. The treatment took 14 weeks as presented in Table 3.4.

Table 3.4

S/N	WEEK	ACTIVITIES	TOPIC
1.	1st Week	(i)Took permission from the school authority (ii) Selected and trained the research assistants (social studies teacher)	
2.	2nd Week	(i)Administered the cognitive style checklist (ii) Conducted the pretest for both experimental and control group	Home appliances, storage, savings and resources.
3.	3rd-10th Week	Commenced treatment for both groups	Home appliances, storage, savings and resources.
4.	11th Week	Conducted post test for both groups	Home appliances, storage, savings and resources.
5.	14th Week	Conducted delayed test for both groups	Home appliances, storage, savings and resources.

3.5.1 Training of Research Assistance: The research assistants (social studies teachers in the schools for the study) were trained in the first weeks. The researcher explained the purpose and procedure for the study to them. The teachers in the experimental group were exposed to the use of the instructional package by the researcher after which they were allowed to use it so as to assess their competence. Each of them was given the operational guideline.

The teachers in the control group were also familiarised with the purpose and procedure for the study. The objectives, content and instructional materials on each topic as contained in the package designed for the experimental group were also given to the teachers in the control group.

3.5.2 Pretest: The Cognitive Style Checklist was administered to the participants in order to categorise them according to their cognitive style though, they were not separated into groups or informed about it. This was followed by the administration of:

(1) Students' Attitude to Social Studies Questionnaire (SASSQ)

(2) Social Studies Achievement Test (SSAT)

3.5.3 Treatment: The participating teachers carried out the treatments in both groups for a period of eight weeks. The researcher went round the schools twice a week to ascertain compliance with the operational guideline.

3.5.4 Experimental Group

1 Steps followed in the experimental group

The participants:

(i) were allotted to computer by the teacher.

(ii) opened the package,

(iii) worked on the package,

(iv) The teacher moved round the classroom to monitor the participants.

(v) The teacher made sure the participants went back to their classrooms when the lesson period was over.

3.5.5 Control Group:

The teacher:

(i) wrote the lesson topic on the chalkboard,

(ii) stated the objectives of the lesson,

(iii) outlined the content of the topic on the chalkboard,

(iv) explained the content by making use of the information provided by the researcher in handling each of the topics

(v) asked questions from the students,

(vi) summarised the lesson, and

(vii) gave assignment.

3.5.6 Posttest: This was administered in the 11th week. The attitude questionnaire was administered before the achievement test.

3.5.7 Delayed-test: The Social Studies Achievement Test was re-administered in the 14th week.

3.6 Data Analysis

Frequency count, mean, standard deviation and simple percentage aspects of descriptive statistics were used in analysing research questions 1 and 2 while Pearson's Product Moment Correlation was used for hypothesis 1. Analysis of Covariance (ANCOVA) of inferential statistics was used in testing hypotheses 2 to 8 using the pretest scores as covariates and Estimated Marginal Mean was computed to show how the groups performed while Scheffe Post-hoc Analysis was used to detect the source of significant difference between the two groups where they exist. All hypotheses were tested at 0.05 level of significance

CHAPTER FOUR

RESULTS

4.1 INSTRUCTIONAL PACKAGE EVALUATION

SECTION A

TABLE 4.1: PACKAGE FUNCTIONALITY AND NAVIGATION

S/N	ITEM	4	3	2	1	Mean	Std. D
1	The operation of the package is accurate	23 (92)	2 (8)	- -	- -	3.92	0.28
2	The information presented in the package is well arranged	19 (76)	6 (24)	- -	- -	3.76	0.44
3	The mouse can easily be used to locate information on the package	22 (88)	2 (8)	- -	1 (4)	3.80	0.65
4	It is easy to go backward or forward making use of the mouse when working on the package	21 (84)	3 (12)	- -	1 (4)	3.76	0.66
5	It is easy to look for relevant information in the package with the use of the mouse	17 (68)	8 (32)	- -	- -	3.68	0.48
6	The information in the package can easily be got by clicking on the relevant icon	21 (84)	3 (12)	- -	1 (4)	3.76	0.66
7	The hint and solution menu in the package help prevent frustration when one cannot solve any of the questions in the puzzle	21 (84)	4 (16)	- -	- -	3.84	0.37
8	The grids to be filled in the puzzle can easily be identified	15 (60)	10 (40)	- -	- -	3.60	0.50
9	It is easy to open and work on the package	16 (64)	5 (20)	3 (12)	1 (4)	3.44	0.87
10	The information presented is well-organised	21 (84)	2 (8)	- -	2 (8)	3.68	0.85
	Weighted average					3.72	

Table 4.1 shows the appropriateness of the package in terms of functionality and navigation. The students agreed with the following that: the operation of the package is accurate ($\bar{x}$ = 3.92), the information presented in the package is well-arranged ($\bar{x}$ = 3.76), the mouse can easily be used to locate information on the package ($\bar{x}$ = 3.80), the mouse can easily be used to navigate backward or forward when working on the package ($\bar{x}$ = 3.76), relevant information in the package can be located with the mouse ($\bar{x}$ = 3.68), the information in the package can be accessed by clicking on the relevant icon ($\bar{x}$ = 3.76), the hint and solution menu in the package help prevent frustration when unable to solve any of the questions in the puzzle ($\bar{x}$ = 3.84), the

grid to be filled can easily be identified ($\bar{x}$ = 3.6), it is easy to open and work on the package ($\bar{x}$ =3.44) and that the information presented is well-organised ($\bar{x}$ = 3.68). The weighted average is 3.72 which lays credence to the positive view of the students with reference to the functionality and navigation of the package.

SECTION B

TABLE 4.2: CONTENT AND GRAPHIC EVALUATION

S/N	ITEM	4	3	2	1	Mean	Std.D
1	The display of information on the screen is appropriate	20 (80)	4 (16)	1 (4)	- -	3.76	0.52
2	The colour used in the package is appropriate	21 (84)	4 (16)	- -	- -	3.84	0.37
3	The information presented can easily be read	20 (80)	2 (8)	2 (8)	1 (4)	3.64	0.81
4	The information presented is simple and clear	19 (76)	5 (20)	- -	1 (4)	3.68	0.69
5	The language of presentation is appropriate	20 (80)	5 (20)	- -	- -	3.80	0.41
6	The information is well-sequenced	16 (64)	7 (28)	- -	2 (8)	3.84	0.87
7	The pictures used are appropriate	18 (72)	5 (20)	1 (4)	1 (4)	3.60	0.76
8	The pictures allow for better understanding of the content	19 (76)	4 (16)	2 (8)	- -	3.68	0.63
9	The sound used in the package is appropriate	18 (72)	6 (24)	- -	1 (4)	3.64	0.70
10	It is not difficult to understand the content of the package	15 (60)	9 (36)	- -	1 (4)	3.52	0.71
	Weighted average					3.66	

Table 4.2 shows the appropriateness of the package in terms of content and graphic evaluation. The students agreed with the following that: the display of information on the screen is appropriate ($\bar{x}$ = 3.76), the colour used in the package is appropriate ($\bar{x}$ = 3.84), the information presented can easily be read ($\bar{x}$ = 3.64), the information presented is simple and clear ($\bar{x}$ = 3.68), that the language of presentation is appropriate ($\bar{x}$ = 3.80), the information is well-sequenced ($\bar{x}$ = 3.84), that the pictures used are appropriate ($\bar{x}$ = 3.60), the pictures allow for better understanding of the content ($\bar{x}$ = 3.68), the sound used is appropriate ($\bar{x}$ = 3.64) and that it is not difficult to understand the content of the package ($\bar{x}$ = 3.52). The mean scores show

the appropriateness of the package in terms of content and graphic presentations. The weighted average of 3.66 lends support to the appropriateness.

SECTION C

TABLE 4.3: USABILITY ASSESSMENT

S/N	ITEM	4	3	2	1	Mean	Std.D
1	It is possible to learn through the package	24 (96)	- -	1 (4)	- -	3.92	0.40
2	I can work on my own by making use of the package	16 (64)	8 (32)	1 4	- -	3.60	0.58
3	Working on the package is interesting	22 (88)	3 (12)	- -	- -	3.88	0.33
4	Solving the puzzle encourages me to remember the content of the instruction	21 (84)	3 (12)	1 (4)	- -	3.80	0.50
5	I understand the information in the package	18 (72)	6 (24)	1 (4)	- -	3.68	0.56
6	It is not difficult to fill the grids	12 (48)	5 (20)	2 (8)	6 (24)	2.92	1.26
7	Working on the package is encouraging	16 (64)	7 (28)	1 (4)	1 (4)	3.72	0.82
8	I did not find it difficult to work on the package	16 (64)	6 (24)	- -	3 (12)	3.40	1.00
9	I can easily move from one page to another when working on the package	17 (68)	4 (16)	1 (4)	3 (12)	3.40	1.04
10	It is easy to know if the answer to a question in the puzzle is correct or not	23 (92)	2 (8)	- -	- -	3.92	0.28
	Weighted average					3.62	

Table 4.3 shows the appropriateness of the package in terms of usability. The students agreed with the following that: it is possible to learn through the package ($\bar{x}$ = 3.92), they can work on the package independently ($\bar{x}$ = 3.60), working on the package is interesting ($\bar{x}$ = 3.88), solving the puzzle encourages them to remember the content of the instruction ($\bar{x}$ = 3.80), the information in the package is understood ($\bar{x}$ = 3.68), it is not difficult to fill the grids ($\bar{x}$ = 2.92), working on the package is encouraging ($\bar{x}$ = 3.72), they did not find it difficult to work on the

package ($\bar{x}$ = 3.40), they can easily move from one page to another when working on the package ($\bar{x}$ = 3.40), it is easy to know if the answer to a question in the puzzle is correct or not ($\bar{x}$ =3.92).

The Table shows that all the items have mean scores of between 2.92 and 3.92 out of a maximum of 4.00. The scores indicate that the package can be used effectively to facilitate learning. This position is further supported by the 3.62 weighted average obtained.

SECTION D

TABLE 4.4: SOCIAL STUDIES TEACHERS' PACKAGE EVALUATION

S/N	ITEM	1	2	3	4
1	The operation of the package is accurate	-	-	-	2
2	The information presented in the package is well arranged	-	-	-	2
3	The information is in line with the curriculum	-	-	-	2
4	The pictures used are relevant	-	-	1	1
5	The information presented is simple and clear	-	-	-	2
6	The language of presentation is appropriate for the students	-	-	1	1
7	Students can learn through the package	-	-	-	2
8	The information is well sequenced	-	-	-	2
9	The package is appealing and good for the students	-	-	1	1
10	The screen display of information is appropriate	-	-	-	2

Table 4.4 shows the responses of the two social studies teachers in the schools used for the trial-test. In their general comments, they agreed that the package is in line with the school curriculum and learning can effectively take place through the use of the package.

4.2: Answers to the Research Questions

Research Question 1: What is the perceived usefulness of JSII social studies students about the computer-based self-learning instructional package?

Table 4.5: Perceived Usefulness of the Computer-based Self-learning Instructional Package by JS II Social Studies Students

S/N	ITEMS	SA	A	D	SD	MEAN	STD.D
1	Using the package can enable me learn social studies effectively	44 (50.0)	32 (36.2)	10 (11.4)	2 (2.3)	3.34	.77
2	Using the package can improve students' academic performance in social studies	47 (53.4)	30 (34.1)	9 (10.2)	2 (2.3)	3.39	.76
3	I perceive the package to be very useful.	25 (28.4)	52 (59.1)	8 (9.1)	2 (2.3)	3.11	.75
4	The package is a welcome development in this computer age	31 (35.2)	47 (53.4)	6 (6.8)	3 (3.4)	3.18	.80
5	The package will make social studies class interesting	44 (50.0)	25 (28.4)	12 (13.6)	2 (2.3)	3.13	1.11
6	It is not difficult to learn through the package	51 (58.0)	20 (22.7)	9 (10.2)	7 (8.0)	3.28	1.02
7	Using the package to learn is a waste of time	4 (4.5)	9 (10.2)	19 (21.6)	54 (61.4)	3.35	.99
8	The package can discourage students from learning social studies	6 (6.8)	10 (11.4)	40 (45.5)	32 (36.4)	3.11	.86
	Weighted average					**3.24**	

Table 4.5 reveals the perceived usefulness of the package by the participants in the experimental group. They agreed on the following that: using the package can enable them learn social studies effectively ($\bar{x}$ = 3.34); using the package will improve students' academic performance in social studies ($\bar{x}$ = 3.39); the package is very useful ($\bar{x}$ = 3.11); the package is a welcome development in this computer age ($\bar{x}$ = 3.18); the package makes social studies class interesting ($\bar{x}$ = 3.13) and that they can learn easily through the package ($\bar{x}$ = 3.28).On the other hand, the students disagreed on the following that: using the package to learn is a waste of time ($\bar{x}$ = 3.35) and the package can discourage students from learning social studies ($\bar{x}$ = 3.11). The weighted average of 3.24 indicates that the level of perceived usefulness of the package by JS II social studies students is high.

Research Question2: What is the perceived ease of use of JS II social studies students about the computer-based self-learning instructional package?

Table 4.6: Perceived Ease of Use of Computer-Based Self-Learning Instructional Package by JS II Social Studies Students

S/N	ITEMS	SA	A	D	SD	MEAN	STD.D
1	I can easily learn through the package	37 (42.0)	45 (51.1)	4 (4.5)	2 (2.3)	3.33	.67
2	I can easily work on the package	26 (29.5)	52 (59.1)	6 (6.8)	2 (2.3)	3.11	.81
3	I find it difficult to work on the package	5 (5.7)	13 (14.8)	22 (25.0)	46 (52.3)	3.19	1.04
4	The information in the package can easily be understood	47 (53.4)	32 (36.4)	6 (6.8)	2 (2.3)	3.39	.81
5	I can easily know if am right when solving the puzzle	26 (29.5)	52 (59.1)	5 (5.7)	3 (3.4)	3.10	.83
6	Much effort is not required to learn through the puzzle	34 (38.6)	33 (37.5)	12 (13.6)	7 (8.0)	3.02	1.03
7	Information in the package cannot be located easily	6 (6.8)	11 (12.5)	49 (55.7)	20 (22.7)	2.90	.91
8	The grids to be filled can easily be identified	27 (30.7)	44 (50.0)	12 (13.6)	4 (4.5)	3.05	.86
	Weighted average					**3.14**	

Table 4.6 shows the perceived ease of use of the package by the participants in the experimental group. They agreed on the following that: they can easily learn through the package ($\bar{x}$ = 3.33); they can easily work on the package ($\bar{x}$ = 3.11); the information in the package can easily be understood ($\bar{x}$ = 3.39); they can easily know when they are right or wrong ($\bar{x}$ = 3.10); the package does not require much effort ($\bar{x}$ = 3.02) and the grids to be filled can easily be identified ($\bar{x}$ = 3.05). However, they disagreed on the following that: they find it difficult to work on the package ($\bar{x}$ = 3.19) and information in the package cannot be located easily ($\bar{x}$ = 2.90). The weighted average of 3.14 implies that the participants' perceived ease of use of the package is high.

4.3: Testing the Null Hypotheses

H_{o1}: There is no significant relationship between JS 11 social studies students' perceived usefulness and perceived ease of use of the computer-based self-learning instructional package.

Table 4.7: Pearson's Product Moment Correlation of the Relationship between Perceived Usefulness and Perceived Ease of Use of the Computer-based Self-learning Instructional Package

Variable	N	Mean	Std.D	R	Sig.	Remark
Perceived Usefulness	88	25.92	4.35	.488	.000	Significant
Perceived Ease of Use	88	25.09	4.23			

Table 4.7 reveals that there is a significant positive relationship between perceived usefulness and the perceived ease of use of the computer-based self-learning instructional package ($r = 0.488$; $p<0.05$). The positive relationship between the perceived usefulness of the package and the perceived ease of use implies that the participants attested to the ability of the package to enhance learning effortlessly in its utilisation. There was significant relationship between JS 11 social studies students' perceived usefulness and perceived ease of use of the computer-based self-learning instructional package. Therefore H_{o1} is rejected.

H_{02a}: There is no significant main effect of treatment on Junior Secondary School students' attitude to social studies

Table 4.8: Analysis of Covariance (ANCOVA) on Students' Attitude to Social Studies

Dependent Variable: POST ATITUDE

Source	Type III sum of Square	Df	Mean square	F	Sig	Partial Eta Square
Corrected Model	1422.203	12	118.517	1.477	.141	.122
Intercept	4344.538	1	4344.538	54.128	.000	.297
PREATT	535.905	1	535.905	6.677	.011	.050
TREATMT	146.164	1	146.164	1.821	.180	.014
SEX	5.862E-02	1	5.862E-02	.001	.978	.000
COGSTY	103.670	2	51.835	.646	.526	010
TREATMT*SEX	8.764	1	8.764	.109	.742	.001
TREATMT*COGSTY	246.422	2	123.211	1.535	.219	.023
SEX* COGSTY	325.393	2	162.696	2.027	.136	.031
TREATMT*SEX* COGSTY	86.275	2	43.137	.537	.586	.008
Error	10273.768	128	80.264			
Total	513433.000	141				
Corrected Total	11695.972	140				

a. R Squared=.122 (Adjusted R Square = .039)

Table 4.8 reveals that there is no significant main effect of treatment on students' attitude towards social studies ($F_{(1,128)}$ = 1.82; P>0.05 ; η^2 = .014). Therefore, H_{02a} is not rejected. To further investigate the attitude of the students across the groups, Table 4.5 presents the magnitude of posttest mean of attitude scores.

Table 4.9: Estimated Marginal Means on Students Attitude

Variable	N	Mean	Std. Error
Pre-score Attitude	141	57.94	-
Post –score Attitude	141	59.89	.83
Treatment			
Control	53	61.02	1.33
Experimental	88	58.76	1.00
Gender			
Male	85	59.87	1.09
Female	56	59.91	1.26
Cognitive style			
FI	59	59.62	1.22
FD	36	61.25	1.65
FN	46	58.79	1.43

Table 4.9 reveals that students in the control groups have higher attitudinal mean score (61.02) than their counterparts exposed to computer-based self-learning instructional package (58.76). However, the difference between them is not statistically significant. It is worth noting that the two groups have positive attitude towards social studies. It must be noted that the post attitudinal mean score is higher than the pre-attitudinal. Further, the post-attitudinal mean score of the experimental group is also higher than that of the pretest. For this high attitude scores not to be significant might be as a result of the fact that the students had high attitudinal mean score at the pretest level (57.94). In the same vein, the higher attitudinal mean score obtained in the control group could have resulted from the fact that the pre-attitudinal mean score for the group was higher than that of the experimental group.

H_{02b}: There is no significant main effect of treatment on Junior Secondary School students' achievement in social studies

Table 4.10: Analysis of Covariance (ANCOVA) on Students' Achievement in Social Studies

Dependent Variable: POST ACHIEVEMENT SCORE

Source	Type III Sum of Square	Df	Mean Square	F	Sig	Partial Eta Squared
Corrected Model	6349.830	12	529.152	19.057	.000	.641
Intercept	7559.442	1	7559.442	272.248	.000	.680
PREACHV	462.167	1	462.167	16.645	.000	.115
TREATMT	4498.063	1	4498.063	161.995	.000*	.559
SEX	9.999E-02	1	9.999E-02	.004	.952	.000
COGSTY	21.359	2	10.679	.385	.681	.006
TREATMT * SEX	29.312	1	29.312	1.056	.306	.008
TREATMT * COGSTY	42.506	2	21.253	.765	.467	.012
SEX * COGSTY	4.608	2	2.304	.083	.920	.001
TREATMT * SEX * COGSTY	94.960	2	47.480	1.710	.185	.026
Error	3554.142	128	27.767			
Total	148460.000	141				
Corrected Total	9903.972	140				

*Significant at P<0.05

a. R Square =.641 (Adjusted R Squared=.607)

Table 4.10 reveals that there is a significant main effect of treatment on students' achievement in social studies ($F_{(1,128)}$ = 162.00; P<0.05 ; η^2 = .559). Therefore, H_{02b} is rejected. To find the group that is significant, the achievement scores of the students across the groups is presented on Table 4.11.

Table 4.11: Estimated Marginal Means on Students Achievement in Social Studies

Variable	N	Mean	Std.Error
Pre-score Achievement	141	19.02	-
Post –score Achievement	141	29.79	.490
Treatment			
Control	53	23.55	.78
Experimental	88	36.03	.59
Gender			
Male	85	29.76	.64
Female	56	29.82	.74
Cognitive style			
FI	59	29.85	.72
FD	36	30.30	.97
FN	46	29.20	.84

Table 4.11 reveals that students exposed to computer-based self-learning instructional strategy have higher achievement mean score (36.03 [72.1%]) than their counterparts in the control group (23.55 [47.1%]); the difference between them is statistically significant. The difference between the two groups in achievement is further presented in Figure 4.1

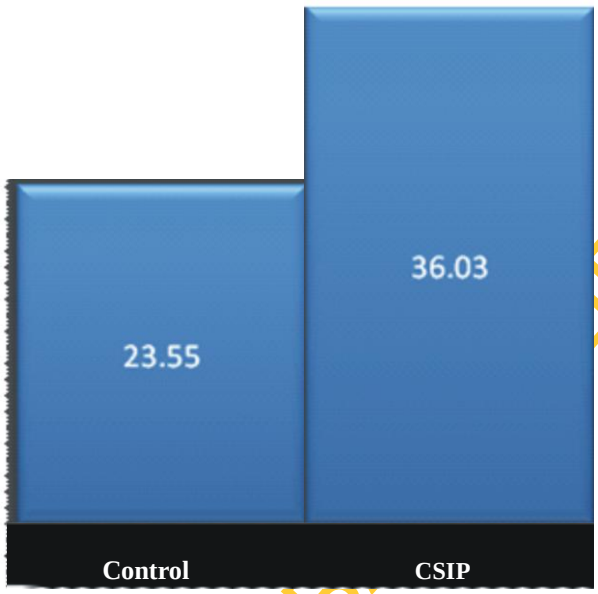


Fig. 4.1: JS II Students' Achievement Scores in Social Studies

H_{02c}: There is no significant main effect of treatment on Junior Secondary School students' retention in social studies.

Table 4.12: Analysis of Covariance (ANCOVA) on Students' Retention Scores in Social Studies

Source	Type III Sum of Square	Df	Mean Square	F	Sig	Partial Eta Squared
Corrected Model	5009.836	12	417.486	13.516	.000	.559
Intercept	5953.571	1	5953.571	192.739	.000	.601
PREACHV	475.429	1	475.429	15.391	.000	.107
TREATMT	3454.800	1	3454.800	111.845	.000*	.466
SEX	9.566	1	9.566	.310	.579	.002
COGSTY	56.463	2	28.231	.914	.404	.014
TREATMT * SEX	13.742	1	13.742	.445	.506	.003
TREATMT * COGSTY	80.892	2	40.446	1.309	.274	.020
SEX * COGSTY	87.065	2	43.532	1.409	.248	.022
TREATMT * SEX * COGSTY	38.568	2	19.284	.624	.537	.010
Error	3953.824	128	30.889			
Total	124777.000	141				
Corrected Total	8963.660	140				

*Significant at P<0.05

a. R Square = .559 (Adjusted R Square =.518

Table 4.12 reveals that there is a significant main effect of treatment on students' retention scores in social studies ($F_{(1,128)}$ = 111.85; P<0.05 ; η^2 = .466). Therefore, H_{02c} is rejected. To find the group that is significant, the achievement scores of the students across the groups is presented on Table 4.13.

Table 4.13: Estimated Marginal Means on Students' Retention Scores in Social Studies

Variable	N	Mean	Std.Error
Pre-score Achievement	141	19.02	-
Post –score Retention	141	27.16	.52
Treatment			
Control	53	21.69	.83
Experimental	88	32.63	.62
Gender			
Male	85	27.45	.68
Female	56	26.87	.78
Cognitive style			
FI	59	27.65	.76
FD	36	27.64	1.03
FN	46	26.19	.89

Table 4.13 reveals that students exposed to computer-based self-learning instructional strategy have higher retention mean score (32.63 [65.3%]) than their counterparts in control groups (21.69 [43.4%]); the difference between them is statistically significant. To further reveal the difference between the two groups in achievement, Figure 4.2 is presented.

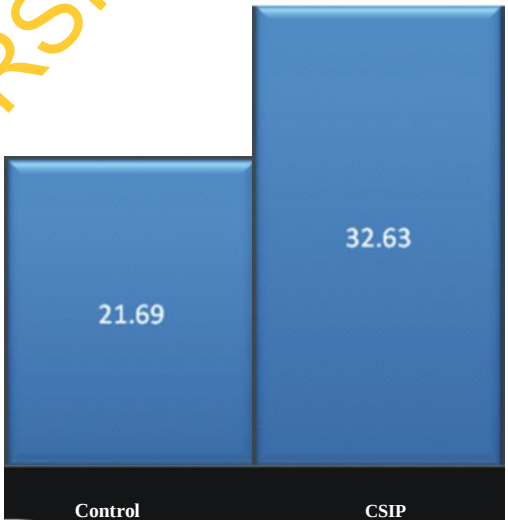


Fig. 4.2: JS II Students' Retention Scores in Social Studies

H_{03a}: There is no significant main effect of gender on Junior Secondary School students' attitude towards social studies.

Table 4.8 reveals there is no significant main effect of gender on students' attitude towards social studies ($F_{(1,128)} = 0.001$; $P>0.05$; $\eta^2 = .000$). Therefore, H_{03a} is not rejected. Table 4.9 shows that female students had higher attitudinal mean score (59.91) than their male counterparts (59.87) but the difference is not statistically significant.

H_{03b}: There is no significant main effect of gender on Junior Secondary School students' achievement in social studies.

Table 4.10 reveals there is no significant main effect of gender on students' achievement in social studies ($F_{(1,128)} = 0.004$; $P>0.05$; $\eta^2 = .000$). Therefore, H_{03b} is not rejected. Table 4.11 shows that female students had higher achievement mean score (29.82) than their male counterparts (29.76) but the difference is not statistically significant.

H_{03c}: There is no significant main effect of gender on Junior Secondary School students' retention in social studies.

Table 4.12 reveals there is no significant main effect of gender on students' retention scores in social studies ($F_{(1,128)} = 0.31$; $P>0.05$; $\eta^2 = .002$). Therefore, H_{03c} is not rejected. Table 4.13 shows that male students had higher retention mean score (27.45) than their female counterparts (26.87) but the difference is not statistically significant.

H_{04a}: There is no significant main effect of cognitive style on Junior Secondary School students' attitude to social studies.

Table 4.8 reveals there is no significant main effect of cognitive style on students' attitude to social studies ($F_{(2,128)} = 0.646$; $P>0.05$; $\eta^2 = .010$). Therefore, H_{04a} is not rejected. Table 4.9 shows that field dependent students had the highest attitudinal mean score (61.25) followed by field independent (59.62) while field neutral had the least (58.79). However, the difference is not statistically significant.

H_{04b}: There is no significant main effect of cognitive style on Junior Secondary School students' achievement in social studies.

Table 4.10 reveals that there is no significant main effect of cognitive style on students' achievement in social studies ($F_{(2,128)} = 0.385$; $P>0.05$; $\eta^2 = .006$). Therefore, H_{04b} is not rejected. Table 4.11 shows that field dependent students had the highest achievement mean score (30.30) followed by field independent (29.85) while field neutral had the least (29.20). However, the difference is not statistically significant.

H_{04c}: There is no significant main effect of cognitive style on Junior Secondary School students' retention in social studies.

Table 4.12 reveals there is no significant main effect of cognitive style on students' retention scores in social studies ($F_{(2,128)}$ = 0.914; P>0.05 ; η^2 = .014). Therefore, H_{04c} is not rejected.

Table 4.13 shows that field independent students had the highest retention mean score (27.65) followed by field dependent (27.64) while field neutral had the least (26.19). However, the difference is not statistically significant.

H_{05a}: There is no significant interaction effect of treatment and gender on Junior Secondary School students' attitude towards social studies.

Table 4.8 reveals there is no significant interaction effect of treatment and gender on students' attitude towards social studies ($F_{(1,128)}$ = 0.109; P>0.05 ; η^2 = .001). Therefore, H_{05a} is not rejected.

H_{05b}: There is no significant interaction effect of treatment and gender on Junior Secondary School students' achievement in Social Studies.

Table 4.10 reveals there is no significant interaction effect of treatment and gender on students' achievement in social studies ($F_{(1,128)}$ = 1.056; P>0.05 ; η^2 = .008). Therefore, H_{05b} is not rejected.

H_{05c}: There is no significant interaction effect of treatment and gender on Junior Secondary School students' retention in social studies.

Table 4.12 reveals there is no significant interaction effect of treatment and gender on students' retention scores in social studies ($F_{(1,128)}$ = 0.445; P>0.05 ; η^2 = .003). Therefore, H_{05c} is not rejected.

H_{06a}: There is no significant interaction effect of treatment and cognitive style on Junior Secondary School students' attitude to social studies.

Table 4.8 reveals there is no significant interaction effect of treatment and cognitive style on students' attitude to social studies ($F_{(2,128)}$ = 1.535; P>0.05 ; η^2 = .001). Therefore, H_{06a} is not rejected.

H_{06b}: There is no significant interaction effect of treatment and cognitive style on Junior Secondary School students' achievement in social studies.

Table 4.10 reveals there is no significant interaction effect of treatment and cognitive style on students' achievement in social studies ($F_{(2,128)}$ = 0.765; P>0.05 ; η^2 = .012). Therefore, H_{06b} is not rejected.

H_{06c}: There is no significant interaction effect of treatment and cognitive style on Junior Secondary School students' retention in social studies.

Table 4.12 reveals there is no significant interaction effect of treatment and cognitive style on students' retention scores in social studies ($F_{(2,128)} = 1.309$; $P>0.05$; $\eta^2 = .020$). Therefore, H_{06c} is not rejected.

H_{07a}: There is no significant interaction effect of gender and cognitive style on Junior Secondary school Students' attitude to social studies.

Table 4.8 reveals there is no significant interaction effect of gender and cognitive style on students' attitude towards social studies ($F_{(2,128)} = 2.027$; $P>0.05$; $\eta^2 = .023$). Therefore, H_{07a} is not rejected.

H_{07b}: There is no significant interaction effect of gender and cognitive style on Junior Secondary School students' achievement in social studies.

Table 4.10 reveals there is no significant interaction effect of gender and cognitive style on students' achievement in social studies ($F_{(2,128)} = 0.083$; $P>0.05$; $\eta^2 = .001$). Therefore, H_{07b} is not rejected.

H_{07c}: There is no significant interaction effect of gender and cognitive style on Junior Secondary School students' retention in social studies.

Table 4.12 reveals there is no significant interaction effect of gender and cognitive style on students' retention scores in social studies ($F_{(2,128)} = 1.409$; $P>0.05$). Therefore, H_{07c} is not rejected.

H_{08a}: There is no significant interaction effect of treatment, gender and cognitive style on Junior Secondary School students' attitude to social studies.

Table 4.8 reveals there is no significant interaction effect of treatment, gender and cognitive style on students' attitude to social studies ($F_{(2,128)} = 0.537$; $P>0.05$). Therefore, H_{08a} is not rejected.

H_{08b}: There is no significant interaction effect of treatment, gender and cognitive style on Junior Secondary School students' achievement in social studies.

Table 4.10 reveals there is no significant interaction effect of treatment, gender and cognitive style on students' achievement in social studies ($F_{(2,128)} = 1.710$; $P>0.05$). Therefore, H_{08b} is not rejected.

H_{08c}: There is no significant interaction effect of treatment, gender and cognitive style on Junior Secondary School students' retention in social studies.

Table 4.12 reveals there is no significant interaction effect of treatment, gender and cognitive style on students' retention scores in social studies ($F_{(2,128)} = 0.624$; $P>0.05$). Therefore, H_{08c} is not rejected.

4.4 Summary of the Findings

1. Students exposed to computer-based self-learning instructional puzzle agreed that the package is useful in enhancing learning,
2. Students exposed to computer-based self-learning instructional puzzle attested to the fact that the package can easily be used by students to facilitate learning.
3. Students' perceived usefulness and ease of use have positive relationship which implies that the perceived usefulness of the package enhanced the ease of use.
4. There is no significant main effect of treatment on students' attitude towards social studies. Students' attitude to social studies maintains the pre-treatment high level.
5. There is significant main effect of treatment on students' achievement in social studies. Students exposed to computer-based self-learning instructional puzzle significantly performed better than those in the conventional group.
6. There is significant main effect of treatment on students' retention in social studies. Students exposed to computer-based self-learning instructional puzzle significantly performed better than those in the conventional group in the delayed test.
7. There is no significant main effect of gender on students' attitude, achievement and retention in social studies.
8. There is no significant main effect of cognitive style on students' attitude, achievement and retention in social studies.
9. There is no significant interaction effect of treatment and gender on students' attitude, achievement and retention in social studies.
10. There is no significant interaction effect of treatment and cognitive style on students' attitude, achievement and retention in social studies.
11. There is no significant interaction effect of gender and cognitive style on students' attitude, achievement and retention in social studies
12. There is no significant interaction effect of treatment, gender and cognitive style on students' attitude, achievement and retention in social studies.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This chapter presents the discussion and implications of findings, conclusion, recommendations and suggestions for further studies as well as contributions to knowledge.

5.1 Discussion of Findings

5.1.1 Students' Perceived Usefulness and Perceived Ease of Use of the Computer-based Self-learning Instructional Package

The findings of this study reveal positive perception of the computer-based self-learning instructional package in terms of usefulness and ease of use. There is positive relationship between the perceived usefulness and perceived ease of use of the package. This implies that the package is accepted by the students as having the capability of facilitating learning and can easily be worked on thereby making it an acceptable instructional strategy in social studies classroom. The positive relationship between the perceived usefulness and perceived ease of use further lays credence to the positive disposition of the students towards the package. This submission is in line with that of Dillon and Morris (1996) and Nida (2006) who posit that the perception of new software by the user would determine the acceptance. The acceptance of the package could be attributed to the design of the package which requires little computer literacy ability on the part of the students to make use of it. The incorporation of elements such as immediate knowledge of results, reinforcement, learning in a relaxed environment coupled with the interactive nature of the package and element of fun could also facilitate the acceptance. The finding corroborates Munoz (2007) which asserts favourable disposition of children to the use of computer, it also lays credence to Singh (2009). The finding further supports Adebowale, Adewale and Oyediran (2010) which reveal high level of interest, approval and confidence in the use of computer-based instructional strategy and its related concerns by secondary school students. The students' perception shows that the computer-based self-learning instructional strategy is an acceptable strategy among Junior Secondary School (JS) social studies' students.

5.1.2 Effect of Treatment on Students' Attitude, Achievement and Retention

The findings of the study show there is no significant effect of treatment on students' attitude towards social studies. Though the control group had higher attitudinal score at the posttest level, the difference is not significant and therefore could not be attributed to the treatment. The pre-treatment attitude score was positive and the situation remained positive after the treatment which implies that the treatment did not have negative effect on students' attitude

towards social studies. The study further reveals that there is significant main effect of treatment on students' achievement and retention in social studies. The experimental group significantly performed better than the control group as reflected by the mean scores obtained in the posttest and delayed test. This implies that the computer-based self-learning instructional puzzle is more effective in facilitating learning and enhancing recall which lends credence to the findings of Aremu and Ayelaagbe (1997), Coulter (2003), Ann (2006), Kaka (2008), Ackert (2009) and, Rubinstein, Dhoble and Ferenchick (2009), Bogar, Kalender and Sarikaya (2012), Awad and Fikry (2013) which reveal the effectiveness of instructional puzzle in facilitating academic achievement. The study further affirms the findings of Adedoja, Abidoye and Afolabi (2013) on the efficacy of instructional puzzles in facilitating learning outcomes in social studies. The interactivity, fun, practice, immediate knowledge of result, self-learning and minimal level of anxiety which are the basic features of the instructional package could account for the significant effect of treatment on learning outcomes and retention in line with the findings of scholars such as Oladele (2004), Morris and Liu (2009), Edwin (2010) and Dale (2011). The finding further supports the postulation of Akinleye (2010) that information does not become knowledge automatically until the learner is actively involved in its processing, The significant effect of treatment on academic achievement and retention can further be explained by the theory of connectionism that stimulus-response association are strengthened through repetition which implies that drill or practice enhances learning and retention. The presentation of the instruction via a medium acceptable to the learner coupled with the incorporation of reinforcement as stipulated by the theory could be responsible for the significance effect of the computer-based self-learning strategy on students' academic achievement and retention.

5.1.3 Effect of Gender on Students' Attitude, Achievement and Retention in Social Studies

The results of the study further show that gender has no significant effect on students' learning outcomes and retention in social studies. This implies that gender as a moderator variable did not account for the significant effect of treatment on learning outcomes and retention in this study. The study corroborates Abdulrahman (2008), Maliki, Ngban and Ibu (2009), Arisi (2011) and Oludipe (2012) that there is no significant effect of gender on learning outcomes. The study further reveals lack of gender influence on students' academic achievement in social studies as asserted by Adeosun (2002), Abdu-Raheem (2010), Abdu-Raheem (2012). The study also attests to lack of gender influence on retention as revealed by Abdu-Raheem (2010) and Abdu-Raheem (2012) but contradicts the finding of Adeosun (2002) and Adeosun (2008) which placed female in a vantage position with respect to retention in social studies. The study also contradicts Okeke

(1999), Awoniyi (2000), Afuwape and Oludipe (2008) who attribute difference in students' learning outcomes to gender influence. The gender neutrality of the package reveals the possibility of bridging the technological gender gap which has been identified by Canada and Brusca (1991) and Aremu and Fasan (2011) through the adoption of the package as instructional strategy in social studies classroom. The fact that gender has no significant effect shows that the instructional package developed based on the theory of connectionism is not inclined to influence learning towards a particular sex. It further shows that personal characteristics are to be looked into in determining the academic achievement and retention of students rather than gender when it involves the use of computer-based self-learning instructional puzzles in social studies.

5.1.4 Effect of Cognitive Style on Students' Attitude, Academic Achievement and Retention in Social Studies

The findings of this study reveal that there is no significant main effect of cognitive style on students' learning outcomes and retention in social studies. This implies that the noticeable improvement in students' academic achievement and retention was not due to the cognitive style of the learners, This result supports Morrison and Frick (1994), Steel (2003), Altun and Cakan (2006) that there is no significant effect of cognitive style on students' learning outcomes but ran contrary to that of Tinajero and Paramo (1997), Hall (2000) and Arisi (2011), and Nnodi, Onuigbo and Eze (2012) who asserts significant difference in students' academic achievement on the platform of cognitive style. The cognitive style neutrality of the instructional package implies that the package could be used to enhance academic achievement and retention of students of diverse cognitive style.

5.1.5 Interaction Effect of Treatment and Gender on Students' Attitude, Achievement and Retention in Social Studies

The results of the study show no significant interaction effect of treatment and gender on students' learning outcomes and retention in social studies. This implies that the noticeable improvement in students' achievement and retention can solely be attributed to the treatment. The gender neutrality of the strategy implies that its use in instructional delivery in social studies classroom would be of equal benefit to male and female social studies students.

5.1.6 Interaction Effect of Treatment and Cognitive Style on Students' Attitude, Achievement and Retention in Social Studies

The study shows that the two-way interaction effect of treatment and cognitive style on students' attitude, achievement and retention in social studies is not significant. This implies that treatment combined with cognitive style does not contribute significantly to students' attitude, achievement and retention in social studies thereby contradicting Chou (2001). The cognitive style neutral-enhancing of the instructional package shows that using it as an instructional strategy in social studies classroom would enhance learning outcomes and retention among learners of diverse cognitive style.

5.1.7 Interaction Effect of Gender and Cognitive Style on Students' Attitude, Achievement and Retention in Social Studies

On the interaction effects of gender and cognitive style, the study found no significant interaction effect of the variables on learning outcomes and retention. This implies that the combined effect of gender and cognitive style did not influence students' learning outcomes and retention in relation to the strategy there by affirming Chou (2001) and Awofala and Nneji (2012), findings.

5.1.8 Interaction Effect of Treatment, Gender and Cognitive Style on Students' Attitude, Achievement and Retention in Social Studies

The interaction effect of treatment, gender and cognitive style on students' learning outcomes and retention was also not significant. This shows that if the treatment is given to students' of different gender and cognitive style, similar results would be achieved in students' learning outcomes and retention in social studies. This result contradicted the finding of Chou (2001) and Awofala and Nneji (2012).

5.2 Implications of the findings

The study has revealed the need to adopt computer-based self-learning instructional puzzles in social studies classroom based on the acceptance of the package developed in this study. The perceived usefulness of the computer-based self-learning instructional puzzles is an indication of the need to integrate technology which could facilitate self-learning in social studies classroom. The positive correlation between the perceived usefulness of the package and the ease of use shows that when students are convinced of the inherent benefits of using a technology-based learning instructional package, they would find it easy to use, this implies that the

educational advantages of using technology for instructional delivery must be kept in focus in developing such package for instructional delivery. The study has further displayed the commitment of social studies students to computer based technology imbued with all necessary elements that will enhance learning in a relaxed instructional environment thereby underscoring the development of computer-based self-learning instructional puzzles on topics in social studies at secondary school level.

It has also shown the appropriateness of the computer-based self-learning instructional puzzle in enhancing students' learning outcomes and retention in social studies at Junior Secondary School level thereby encouraging the development and use of such package in social studies classroom. The implication of the higher retention score obtained by the experimental group is that transfer of learning into real life situation as expected in social studies could be enhanced via the use of self-learning computer based instructional puzzles strategy thereby underscoring its incorporation as a learning strategy in social studies at Junior Secondary School level.

The fact that the effectiveness of the package is not gender or cognitive style biased shows that it would be appropriate in facilitating learning if integrated into social studies classroom. Students of different gender and cognitive style would benefit equally from the instructional strategy if employed in social studies classroom. Premised on the results, the use of computer-based self-learning instructional puzzles should be encouraged in social studies.

5.3 Conclusion

The focus of this study is to enhance learning outcomes and retention in social studies through the design and development of self-learning computer-based instructional puzzle. The package was designed and developed in accordance with the laid down procedure, it was subsequently use to determine the effects on students' learning outcomes and retention. The results reveal that the students exposed to the package were positively disposed to it. It also reveals that the use of the package significantly enhanced students' academic achievement and retention in social studies. The strategy is gender and cognitive style neutral, thereby underscoring its relevance as an instructional strategy in social studies classroom.

5.4 Recommendations

Based on the findings, the following recommendations are made:

- The use of computer-based self-learning instructional puzzles in social studies classroom at Junior Secondary School level should be encouraged.
- Social studies teachers should be assisted to acquire skills to develop computer-based self –learning instructional puzzles.
- Necessary facilities that can facilitate effective use of computer-based self-learning instructional puzzles should be provided in all schools.
- Serving and pre-service social studies teachers should be exposed to the design, development and utilisation of computer-based self-learning instructional puzzles in social studies classroom.
- Curriculum planner should incorporate the utilisation of computer-based self-learning instructional puzzles into social studies curriculum at Junior Secondary School level.
- Seminars, workshops, symposia and conferences should be organised at by stake holder in the educational system to expose both serving and pre-service social studies teacher to the development and use of computer-based self-learning instructional puzzles in social studies classroom

5.5 Suggestions for further study

This study was conducted in two local government areas based on selection of four schools. Therefore, further research activities should cover more local government areas and schools. The study was based on three themes subdivided into seven topics for a period of eight weeks based on social studies curriculum for JS 11 students. Therefore, more topics should be included in future studies.

Gender and cognitive style are the two dependent variables investigated in this study, other variables such as school location, verbal ability and computer literacy level of students could be included in future studies.

5.6 Contributions to knowledge

- This study has provided empirical evidence of social studies students' acceptance of computer-based self-learning instructional puzzles as an instructional strategy in social studies classroom.

- It has also revealed the effectiveness of computer-based self-learning instructional puzzles in enhancing students' academic achievement and retention in social studies.
- It has also revealed gender and cognitive style neutrality of the computer-based self-learning instructional puzzles thereby showing the effectiveness of the strategy in enhancing students' achievement and retention in social studies.
- It has contributed to the integration of technology into the social studies classroom.
- The model developed for the design and development of the computer-based self-learning instructional puzzle could be used for development of computer-based instructional package in social studies.

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APPENDIX I

COGNITIVE STYLE CHECKLIST (CSC)

INSTRUCTION: Please respond to each of the items by choosing "a" or" b" based on your assessment of yourself.

DEMOGRAPHIC DATA

NAME: ……

SCHOOL: ……

SEX: Male ☐ **Female** ☐

1a. I can read and understand in a noisy environment.

b. I can't read and understand in a noisy environment

2a. I enjoy analysing problems before finding solutions to them.

b. I don't like analyzing problem.

3a. I always feel the need to understand everything that I read or hear.

b. I don't always feel the need to understand everything that I read or hear

4a. I prefer working alone to working with other people.

b. I prefer working with other people to working alone.

5a. My performance at school is not determined by what people say about me.

b. What people say about me affects my performance

6a. I assess myself based on my performance.

b. I don't always assess myself based on my performance.

7a. I like doing things in different ways.

b. I like to do things based on what other people do.

8a. I don't need encouragement from other people in order to learn well.

b. I learn well when I am encouraged by other people.

9a. I always set goals for myself.

b. I don't set goals for myself

10a. I try to solve my problem by myself.

b. I try to solve my problems by seeking assistance from others.

11a. I don't rely on others for guidance.

b. I rely on others for guidance.

12a. I don't blame others for my failure.

b. I blame others for my failure.

APPENDIX II

STUDENTS' ATTITUDE TOWARDS SOCIAL STUDIES QUESTIONNAIRE (SASSQ)

INSTRUCTION: This questionnaire is designed to assess the disposition of students towards social studies. Kindly tick the appropriate column from the scale provided based on your disposition to Social Studies. Your response has nothing to do with your personality or the dignity of your school.

Use the key: SA = Strongly agreed A = Agreed

D = Disagreed SD= Strongly disagreed

DEMOGRAPHIC DATA

1. **NAME:** _____
2. **SCHOOL:** _____
3 **SCHOOL TYPE: Private** ☐ **Public** ☐
4. **SEX: Male** ☐ **Female** ☐

S/N	ITEM	SA	A	D	SD
1.	I would like to attend social studies lesson more often				
2.	Social studies knowledge helps in understanding social issues				
3.	I enjoy studying social studies.				
4	I will like to do social studies related courses in higher institution.				
5	I admire people who have a good knowledge of social issues				
6	I do social studies because it is a compulsory subject at junior secondary school level				
7	The studying of social studies should be made compulsory at all levels.				
8	I don't like reading social studies textbooks.				
9	I prefer other school subjects to social studies				
10	I feel at ease in social studies class				
11	It is difficult to learn social studies.				

12	I don't like spending my leisure time solving social studies problem.				
13	The progress of social studies contributes to the development of a country.				
14	Social studies should not be a compulsory subject				
15	The study of social studies should be encouraged by government.				
16	I enjoy reading social studies textbooks				
17	I don't like buying social studies textbooks.				
18	Those who study social studies at higher institution may not secure good job.				
19	It takes a lot of time to learn social studies because it does not involve practical activities .				
20	I get bored in social studies class				

APPENDIX III

SOCIAL STUDIES ACHIEVEMENT TEST

INSTRUCTION: Select the appropriate option from the ones provided to answer each of the following questions.

DEMOGRAPHIC DATA

1. **NAME:**_____
2. **SCHOOL:**_____
3. **SCHOOL TYPE: Private** ☐ **Public** ☐
4. **SEX: Male** ☐ **Female** ☐

1. What is the general name for those gadgets and things we make use at home to satisfy our needs? (a) Tools (b) Home appliances (c) Home gadgets (d) Home materials.
2. Which of the following is a kitchen appliance that automatically washes, rinses and dries Kdishes and utensils? (a) Washer (b) Rinse (c) Kitchen washer (d) Dish washer.
3. Identify any of these home appliances that uses electro-magnetic energy to heat and cook food. (a) Microwave oven (b) Electric cooker (c) Stove (d) Gas cooker.
4. Which of the following is not an electric gadgets? (a) Electric kettle (b) Electric iron (c) Toaster (d) Coal pot
5. Which of the following is a large piece of electrical kitchen equipment shaped like a cupboard, use for preserving food and cold drinks?
   (a) Cabinet (b) Refrigerator (c) Ice block machine (d) Electric oven
6. While electric cooker is to boiling water, what do we use for grinding?.
   (a) Mortal (b) Stone (c) Blender (d) Toasting machine.
7. Identify a general term for burns, scald, dislocation or fracture that can result from wrong use of home appliances. (a) Injuries (b) Prizes (c) Benefits (d) Opportunities
8. Underline any of the following that can result from wrong use of electrical appliances.
   (a) Happiness (b) Failure (c) Flood (d) Fire outbreak.
9. If injuries from fire are called burns, what is the appropriate term for injuries from hot water? (a) Injury (b) Accident (c) Wound (d) Scald.
10. Which of the following can cause the breakdown of home appliances? (a) Good use (b) Wrong use (c) Careful use (d) Normal use.
11. Which of the following can be caused through the use of wet hands to plug electric gadgets? (a) Electric failure (b) High voltage (c) Electric shock (d) Low voltage.

12. What is the term used to describe the information giving by a manufacturer on how to use our appliances so that they may last long?
(a) Instruction (b) Law (c) Statement (d) Address.

13. Which of the following people should we consult for the repair of our home appliances?
(a) Radionic (b) Expert (c) Electrician (d) Repairer.

14. Which of the following ways of storing things helps in removing or reducing the water content of the things? (a) Drying (b) Bagging (c) Sealing (d) Refrigerating

15. What do we call an injury that occurs when electric shock throws off the user and results in broken bone? (a) Wound (b) Death (c) Fracture (d) Dislocation

16. What is the appropriate term for keeping things safely for future use? (a) Saving (b) Storage (c) Ware housing (d) Banking

17. Where are yam tubers kept for storage in the traditional system? (a) Store (b) Roof (c) Bank (d) Barn

18. Which of the following is a modern method of preserving things?
(a) Salting (b) Smoking (c) Sun drying (d) Refrigerating

19. Which of the following can be sun dried for future use? (a) Wood (b) Paper (c) Vegetable (d) Rice

20. What can we do to keep meat and fish for future use? (a) cook (b) smoke (c) cut (d) burn

21. Where do we derive pepper, tomatoes, yams, vegetables, rice, fruits, beans and corn?
(a) Local area (b) Foreign countries (c) Farm (d) Industry

22. Which of the following is not a reason for storing things?
    a. To keep them fresh for future use
    b. To retain the good condition
    c. To create scarcity and sell at high prices
    d. To make things last longer.

23. Which of the following is the most appropriate for saving money?
    (a) Strong room (b) Bank (c) Warehouse (d) Underground

24. One of these is not a reason for savings (a) To have money for future use (b) To solve unexpected problem (c) For investment (d) To boost one's image

25. Which of the following is not a method of saving money in the past? (a)Keeping money in banks and micro finance houses (b)Keeping money in pots (c) Keeping money with relations (d)Keeping money underground

26. Identify any of the following that is not a modern way of saving. (a) Saving in

banks (b) Keeping money under pillow (c) Buying of stocks/shares (d) Saving in finance houses and cooperative societies

27. Choose any of the following that is an advantage of keeping money in bank.(a) It yields profit (b) It yields interest (c) It yields rate (d) It yields tax

28. Which of the following is not an advantage of keeping money in bank?
(a) It helps to control reckless spending. (b) Money kept in bank can be withdrawn when needed. (c) Error in documentation could prevent customers from accessing their money. (d) It reduces the risk of theft or loss.

29. Identify any of the following problems that is not associated with keeping money in banks . (a) Difficult conditions for opening and operating bank account (b) Bank account owners receive interest on the amount saved. (c) Illiteracy on the part of bank customers on how to operate bank account. (d) Bank robbery

30. Which of the following will not help in solving the problem associated with keeping money in bank? (a) Educating the public on the advantages of operating bank account. (b) Reducing the interest on money kept in bank (c) Using modern gadgets in service delivery and security by bank operators (d) Embarking on impressive and attractive customers' care service delivery.

31. Underline the general term for the materials we use for the development of our society.
(a) Resources (b) Raw materials (c) Farm produce (d) Mineral resources

32. Which of the following is not a type of resources? (a) Human and natural resources (b) Agricultural resources (c) Artificial resources (d) Capital resources

33. Identify any of the following that resources are not used for. (a) Provision of raw materials for industries (b) Pollution of the environment (c) Creation of employment opportunities (d) Serving as sources of foreign exchange earning.

34. Which of the following is the main raw material for textile industry? (a) Tread (b) Cotton (c) Colourant (d) Machine

35. Which of the following is a source of fruit drinks? (a) Apple (b) Mango (c) Juice (d) Fruits

36. Which of the following can be produced from coffee and cocoa? (a) Tea (b) Beverage (c) Drinks (d) Drugs

37. What is the source of milk, wool and leather? (a) Industries (b) Market
(c) Animals (d) Cow

38. Which of the following is a major mineral resource in Nigeria? (a) Petrol (b) Kerosene
(c) Crude oil (d) Natural gas

39. Underline the source of canoe, wooden chairs, wooden box and furniture.
(a) Timber (b) Market (c) Carpenter (d) Industry

40. If limestone is the source of cement, what is the source of petrol? (a) Mineral (b) NNPC (c) Crude oil (d) Filling station

41. What is the common source of petrol, kerosene, engine oil, polish, candle? (a) Crude oil (b) Petroleum (c) Mineral resources (d) Natural resources

42. Which of the following resources organizes other resources for the development of a society? (a) Local (b) Foreign (c) Human (d) Farm

43. Which of the following ways of saving money can we categorise the ideal of burying money in the ground? (a) Modern (b) Local (c) Natural (d) Traditional

44. Which of the following is not a traditional method of keeping money?
(a) Wrapping the money and burying it in the ground. (b) Hiding money in bamboos which are put on the roof of buildings (c) Keeping money with relatives and money keepers (d) Saving through cooperative society.

45. Which of the following is a reason for adding salt to food? (a) Water (b) Bacteria (c) Ants (d) Flies

46. What is the term used when money is kept for future use? (a) Banking (b) Savings (c) Accounting (d) Book keeping

47. Which of the following is the highest bank in Nigeria? (a) First Bank (b) Union Bank (c) Commercial Bank (d) Central Bank

48. Which of the following is not a way of storing things? (a) Sealing (b) Bottling (c) Canning (d) Carving

49. Which method of preserving food is canning? (a) Modern (b) Traditional (c) Social (d) Local

50. When does storing during the time of plenty become an advantage? (a)Time of abundance (b) Time of excess (d)Time of scarcity (d)Time of harmattan

APPENDIX IV

INSTRUCTIONAL PACKAGE EVALUATION QUESTIONNAIRE (IPEQ)

The items in this questionnaire are meant to evaluate the package. Kindly rate the items based on your assessment of the package.

SECTION A

PACKAGE FUNCTIONALITY AND NAVIGATION

S/N	ITEM	4	3	2	1
1	The operation of the package is accurate				
2	The information presented in the package is well arranged				
3	The mouse can easily be used to locate information on the package				
4	It is easy to go backward or forward making use of the mouse when working on the package				
5	It is easy to look for relevant information in the package with the use of the mouse				
6	The information in the package can easily be got by clicking on the relevant icon				
7	The hint and solution menu in the package help to prevent frustration when one cannot solve any of the questions in the puzzle				
8	The grids to be filled in the puzzle can easily be identified				
9	It is easy to open and work on the package				
10	The information presented is well organised				

SECTION B

CONTENT AND GRAPHIC EVALUATION

S/N	ITEM	4	3	2	1
1	The display of information on the screen is appropriate				
2	The colour used in the package is appropriate				
3	The information presented can easily be read				
4	The information presented is simple and clear				
5	The language of presentation is appropriate				
6	The information is well sequenced				
7	The pictures used are appropriate				
8	The picture allows for better understanding of the content				
9	The sound used in the package is appropriate				
10	It is difficult to understand the content of the package				

SECTION C

USABILITY ASSESSMENT

S/N	ITEM	4	3	2	1
1	It is possible to learn through the package				
2	I can work on my own by making use of the package				
3	Working on the package is interesting				
4	Solving the puzzle encourages me to remember the content of the instruction				
5	I understand the information in the package				
6	It is not difficult to fill the grids				
7	Working on the package is not encouraging				
8	I found it difficult to work on the package				
9	I can easily move from on page to another when working on the package				
10	It is easy to know if the answer to a question in the puzzle is correct or not				

SOCIAL STUDIES TEACHERS' PACKAGE EVALUATION

S/N	ITEM	1	2	3	4
1	The operation of the package is accurate				
2	The information presented in the package is well arranged				
3	The information is in line with the curriculum				
4	The pictures used are relevant				
5	The information presented is simple and clear				
6	The language of presentation is appropriate for the students				
7	Students can learn through the package				
8	The information is well sequenced				
9	The package is appealing and good for the students				
10	The screen display of information is appropriate				

General comments on the package

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APPENDIX V

INSTRUCTIONAL PACKAGE PERCEPTION QUESTIONAIRE

SECTION A: PERCEIVED USEFULNESS

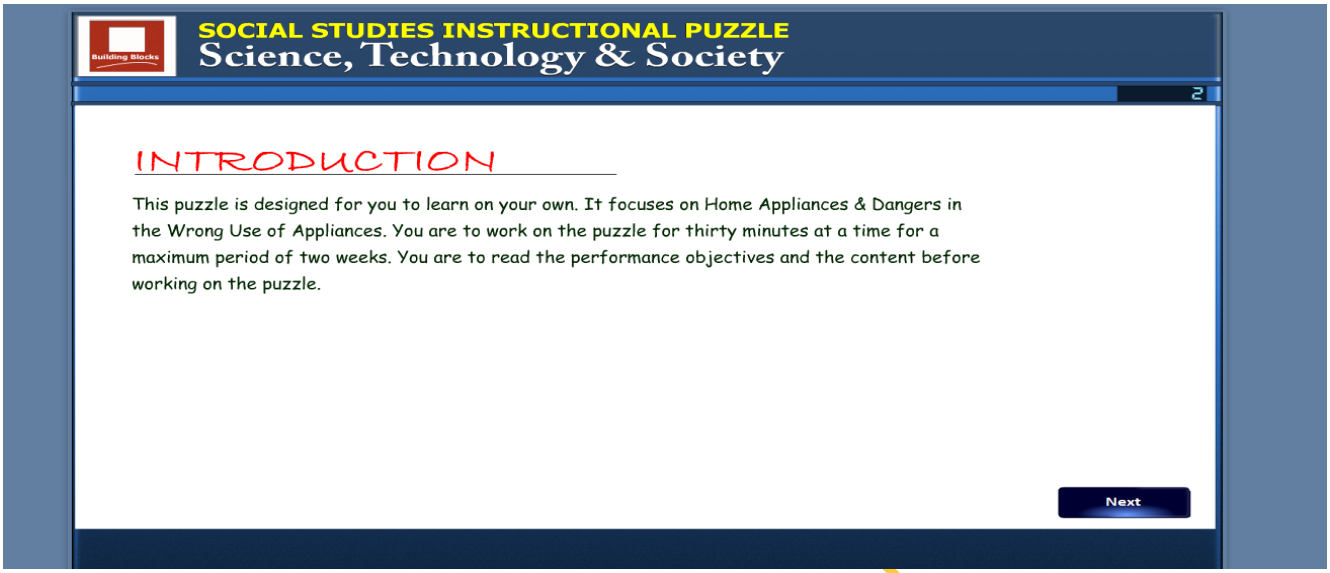
S/N	ITEMS	SA	A	D	SD
1	Using the package can enable me learn social studies effectively				
2	Using the package can improve students' academic performance in social studies				
3	I perceive the package to be very useful.				
4	The package is a welcome development in this computer age				
5	The package will make social studies class interesting				
6	It is not difficult to learn through the package				
7	Using the package to learn is a waste of time				
8	The package can discourage students from learning social studies				

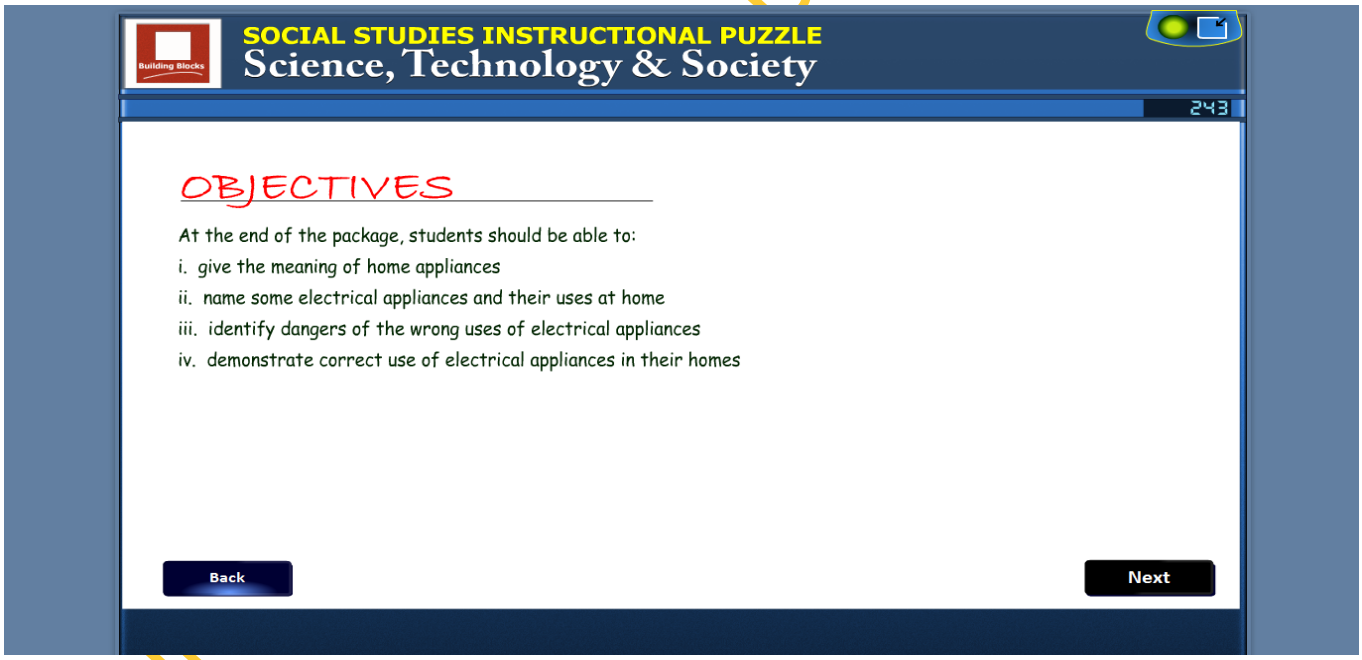
SECTION B: PERCEIVED EASE OF USE

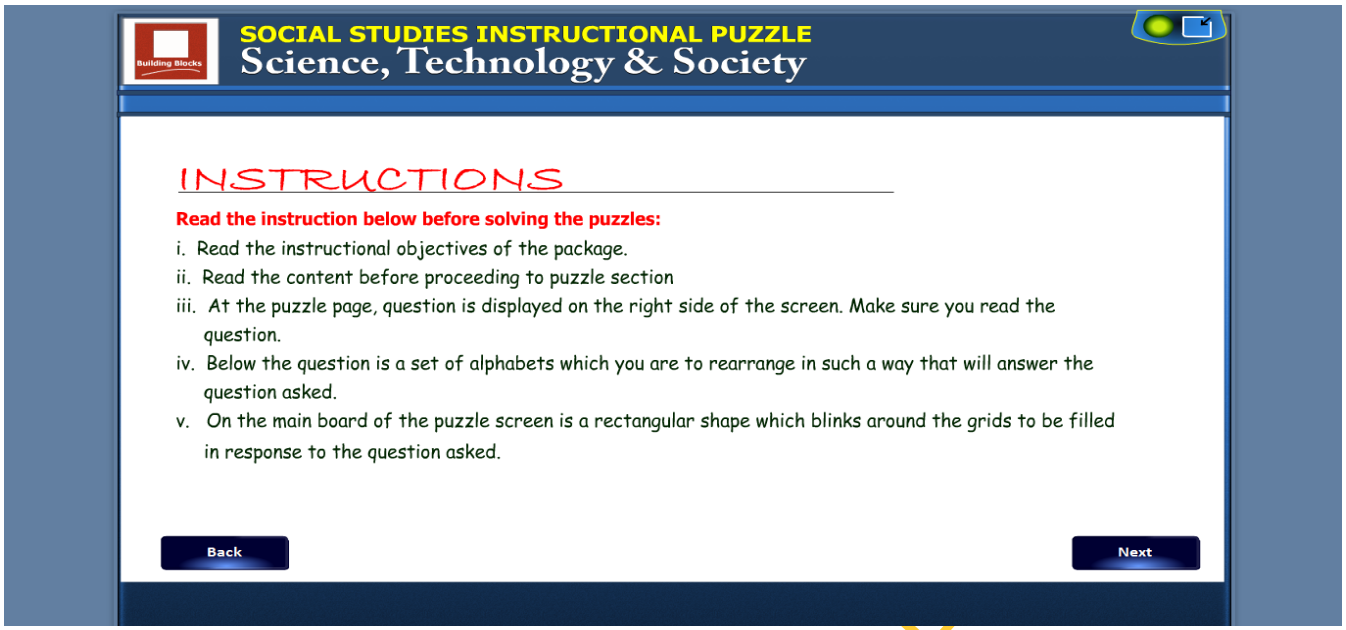
S/N	ITEMS	SA	A	D	SD
1	I can easily learn through the package				
2	I can easily work on the package				
3	I find it difficult to work on the package				
4	The information in the package can easily be understood				
5	I can easily know if am right when solving the puzzle				
6	Much effort is not required to learn through the puzzle				
7	Information in the package cannot be located easily				
8	The grids to be filled can easily be identified				

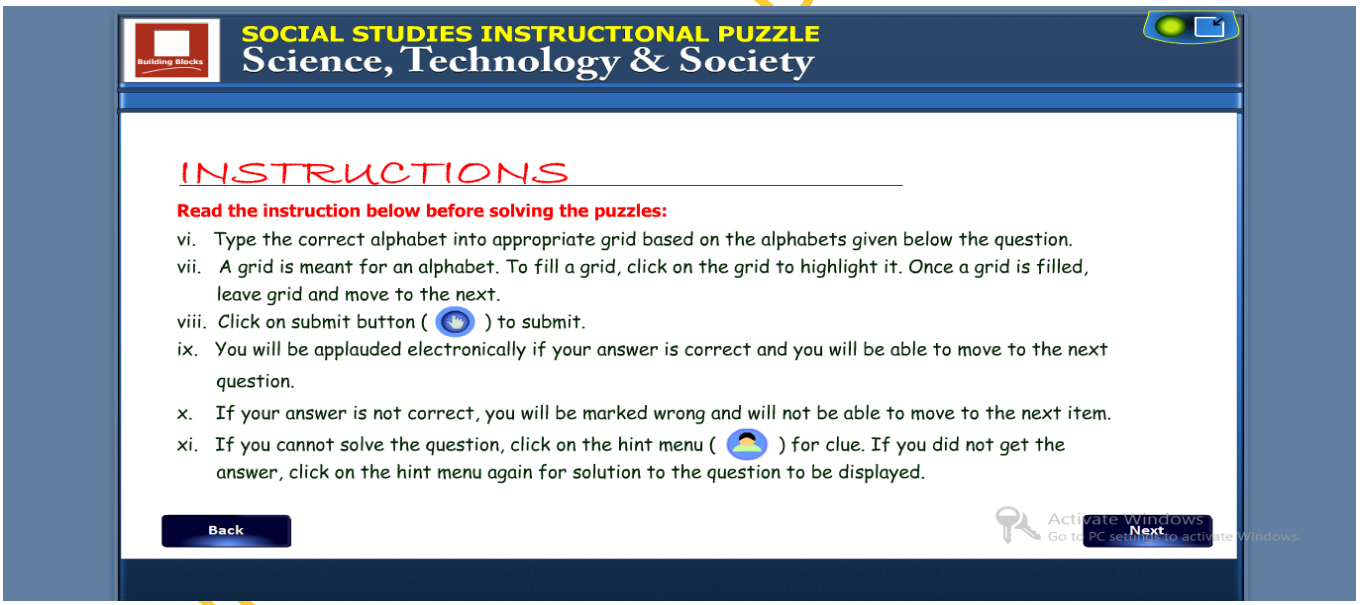
APPENDIX VI

Instructional Puzzles for the Experimental Group






SOCIAL STUDIES INSTRUCTIONAL PUZZLE
Science, Technology & Society
INSTRUCTIONS
Read the instruction below before solving the puzzles:
i. Read the instructional objectives of the package.
ii. Read the content before proceeding to puzzle section
iii. At the puzzle page, question is displayed on the right side of the screen. Make sure you read the question.
iv. Below the question is a set of alphabets which you are to rearrange in such a way that will answer the question asked.
v. On the main board of the puzzle screen is a rectangular shape which blinks around the grids to be filled in response to the question asked.
Back
Next


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
Science, Technology & Society
INSTRUCTIONS
Read the instruction below before solving the puzzles:
vi. Type the correct alphabet into appropriate grid based on the alphabets given below the question.
vii. A grid is meant for an alphabet. To fill a grid, click on the grid to highlight it. Once a grid is filled, leave grid and move to the next.
viii. Click on submit button ( ) to submit.
ix. You will be applauded electronically if your answer is correct and you will be able to move to the next question.
x. If your answer is not correct, you will be marked wrong and will not be able to move to the next item.
xi. If you cannot solve the question, click on the hint menu ( ) for clue. If you did not get the answer, click on the hint menu again for solution to the question to be displayed.
Back
Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE
Science, Technology & Society

1325

CONTENT

The images below show the things we use at home.
They are called home appliances.


Knife


Pots


Plate


Mortar & pestle

Move your cursor over the images

Back

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE
Science, Technology & Society

847

CONTENT

Move your cursor over each of the pictures below


Oven


Dishwasher


Microwave oven uses electro-magnetic energy to heat and cook food.


Washing & drying machine

Back

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

Science, Technology & Society

CONTENT

Move your cursor over each of the pictures below


Toaster


Blender


Electric kettle


Electric iron


Refrigerator

Some of the home appliances need electricity to function. They are called electrical appliances; examples include: electric kettle, refrigerator, iron, television etc.

Back Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

Science, Technology & Society

CONTENT

You can break your leg or hand if you are thrown off by electric shock

You can cut your finger if you are not careful in using sharp objects

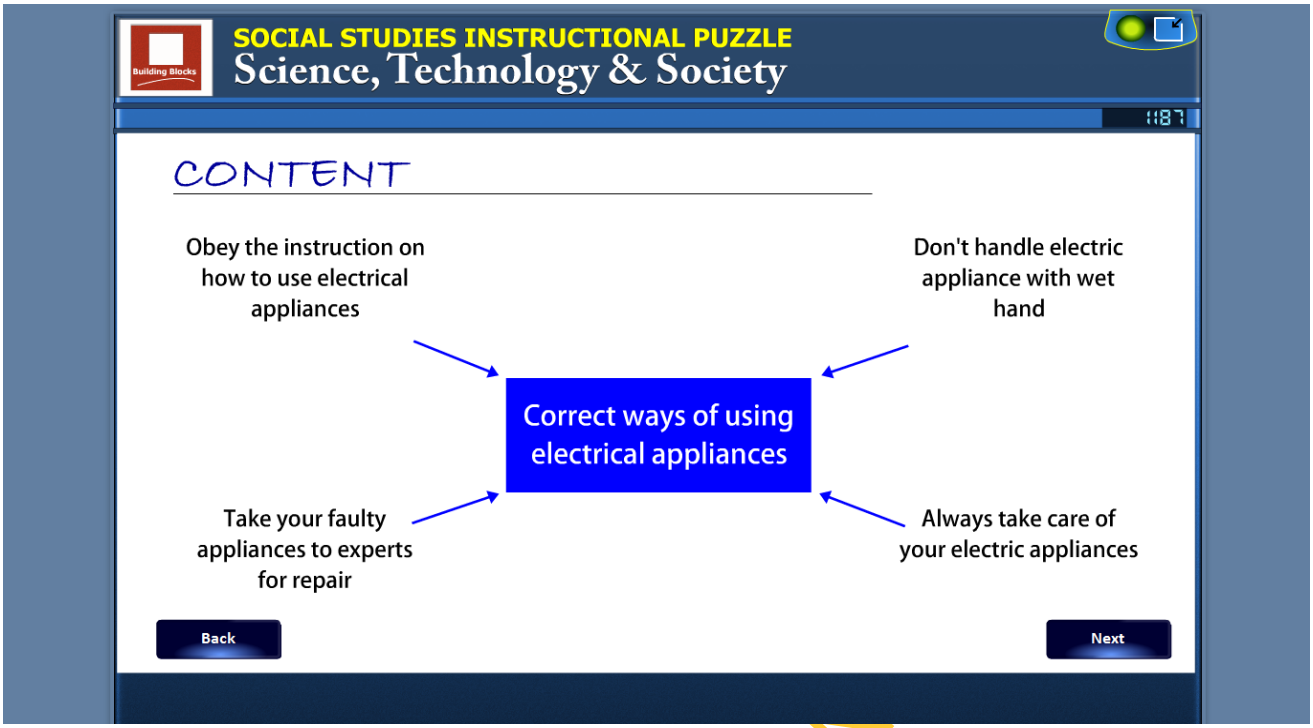
Handling electrical gadgets with wet hand can lead to electric shock

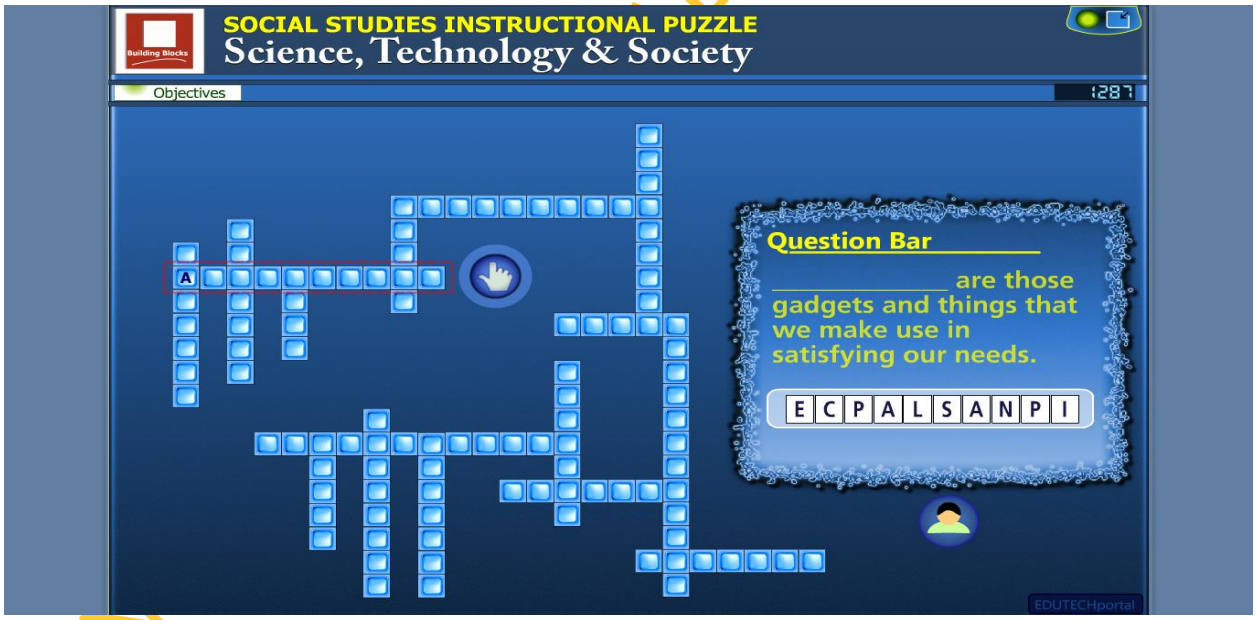
Dangers in the wrong use of appliances

Faulty electrical appliances can lead to fire outbreak

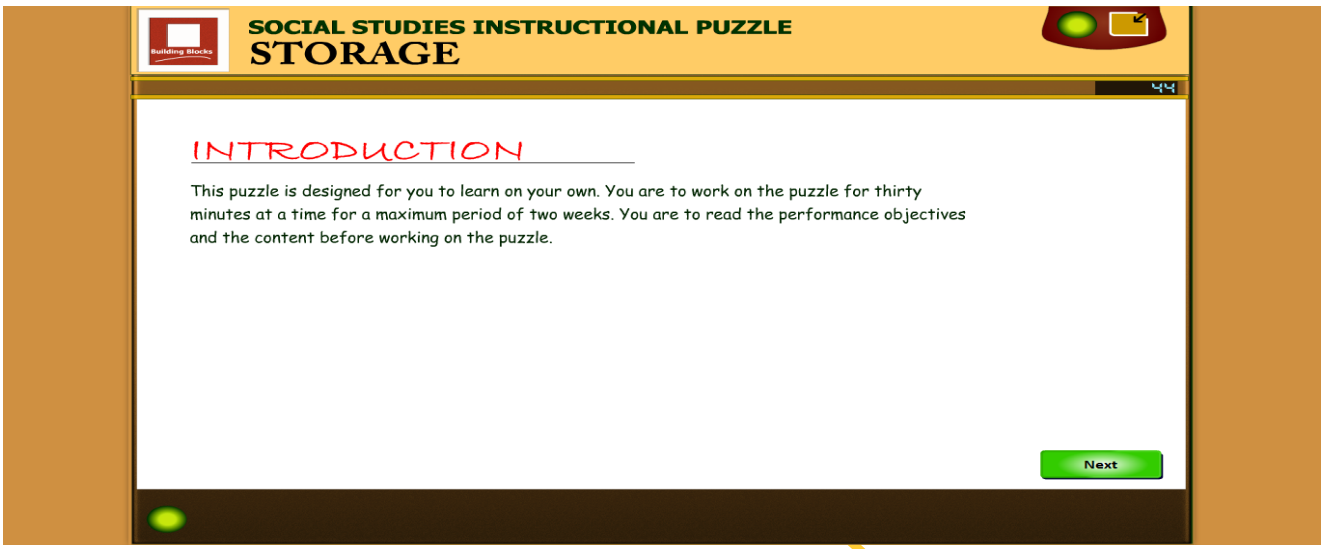
Wrong use of appliances can spoil them

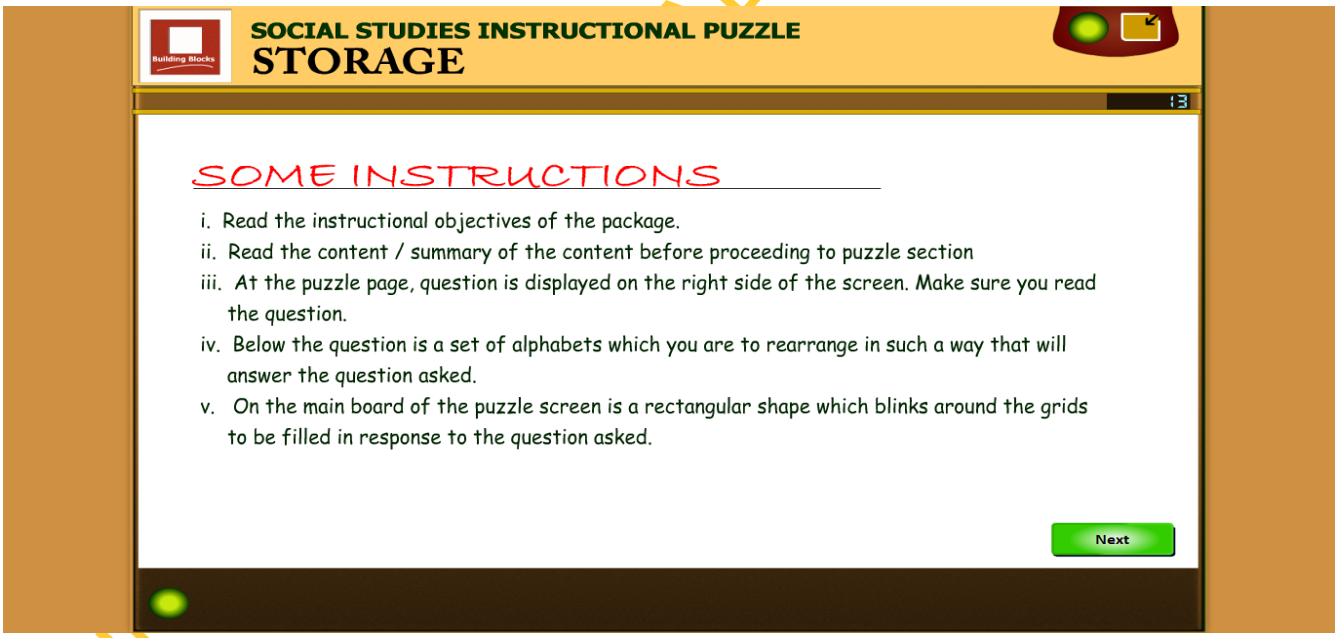
Back Next

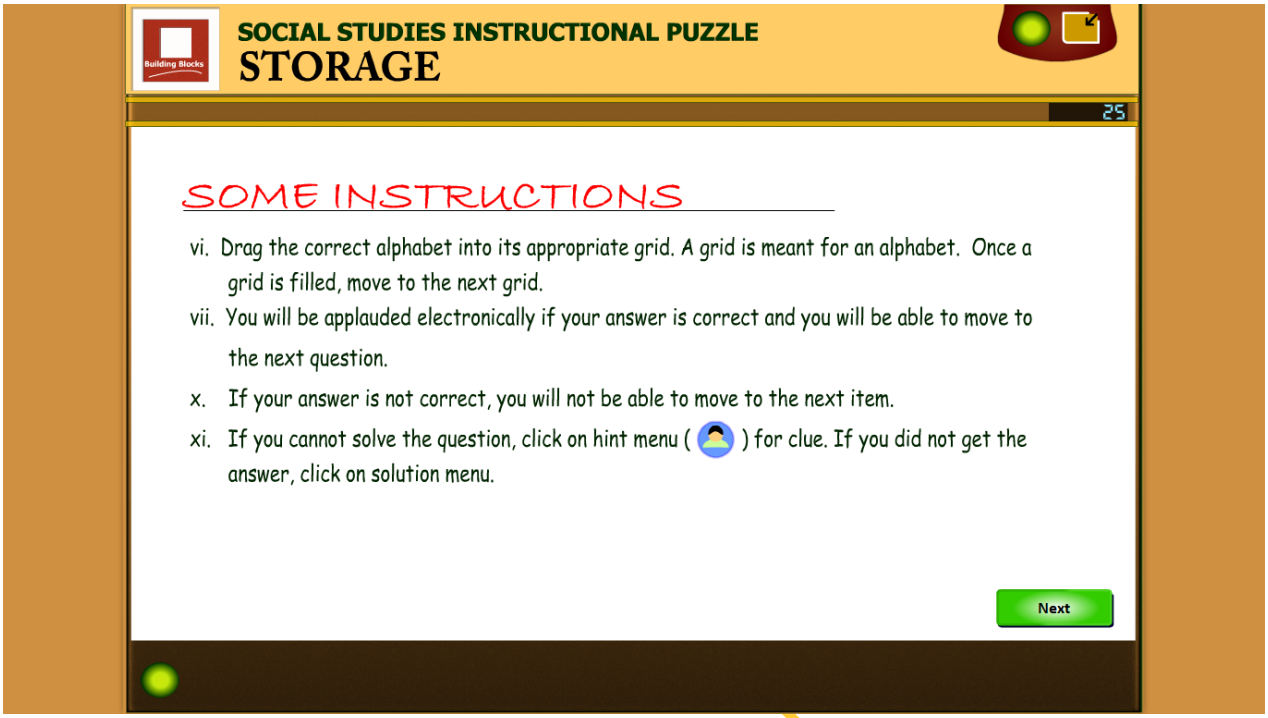

SOCIAL STUDIES INSTRUCTIONAL PUZZLE
Science, Technology & Society
CONTENT
Obey the instruction on how to use electrical appliances
Don't handle electric appliance with wet hand
Correct ways of using electrical appliances
Take your faulty appliances to experts for repair
Always take care of your electric appliances
Back
Next


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
Science, Technology & Society
Objectives
Question Bar
_____ are those gadgets and things that we make use in satisfying our needs.
E C P A L S A N P I
EDUTECHportal

Weeks 3-4


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
STORAGE
44
INTRODUCTION
This puzzle is designed for you to learn on your own. You are to work on the puzzle for thirty minutes at a time for a maximum period of two weeks. You are to read the performance objectives and the content before working on the puzzle.
Next


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
STORAGE
13
SOME INSTRUCTIONS
i. Read the instructional objectives of the package.
ii. Read the content / summary of the content before proceeding to puzzle section
iii. At the puzzle page, question is displayed on the right side of the screen. Make sure you read the question.
iv. Below the question is a set of alphabets which you are to rearrange in such a way that will answer the question asked.
v. On the main board of the puzzle screen is a rectangular shape which blinks around the grids to be filled in response to the question asked.
Next



SOCIAL STUDIES INSTRUCTIONAL PUZZLE

STORAGE

OBJECTIVES

At the end of the package, students should be able to:

1.explain the meaning of storage.

2.mention two ways of storing things in the olden and modern days.

3.mention the things we store

4.mention one reason for storing things properly

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

STORAGE

Content on Storage

Storage means keeping things safe for future use. There are different ways of storing our belongings. For instance, you keep your books inside your bag or locker to make sure that they are safe. Look at the pictures below, they show different ways of storing things.

Book shelf for storing books

Warehouse for storing goods produced in industry

Yam barn keeps the yam off ground

A fridge containing fruits and juice

Back

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

STORAGE

5:17

Ways of storing things

(1) **Drying:** This is done by exposing things to be dried to sunlight. Look at the picture below, what is the woman doing?

The woman is drying cocoa beans in the sun

Back Next

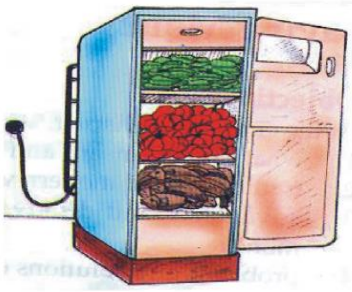
SOCIAL STUDIES INSTRUCTIONAL PUZZLE

STORAGE

33097

Ways of storing things

(2) **Refrigeration:** That is keeping things inside refrigerator. It is a modern way of storing food, meet, fruits and drinks.



Back

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

STORAGE

33765

Ways of storing things

(4) **Bagging:** This refers to keeping things inside bag e.g yam, beans, rice, maize. Look at the picture below, what are the people doing?

The people are packing beans inside the bags

Back

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

STORAGE

33589

Ways of storing things

(3) **Sealing:** This involves packing things inside containers such as nylon, bottle, can, plastic etc. Below are some examples.

Sealing is a modern way of preserving things.

Back

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

STORAGE

33894

Ways of storing things

(5). Salting: This means adding salt to raw food items (e.g meat, fish) so as to preserve it. Salt prevents bacteria from getting into meat or fish. It is a traditional way of preserving food.

Look at the above picture, it shows salt being added to raw meat.

Back Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

STORAGE

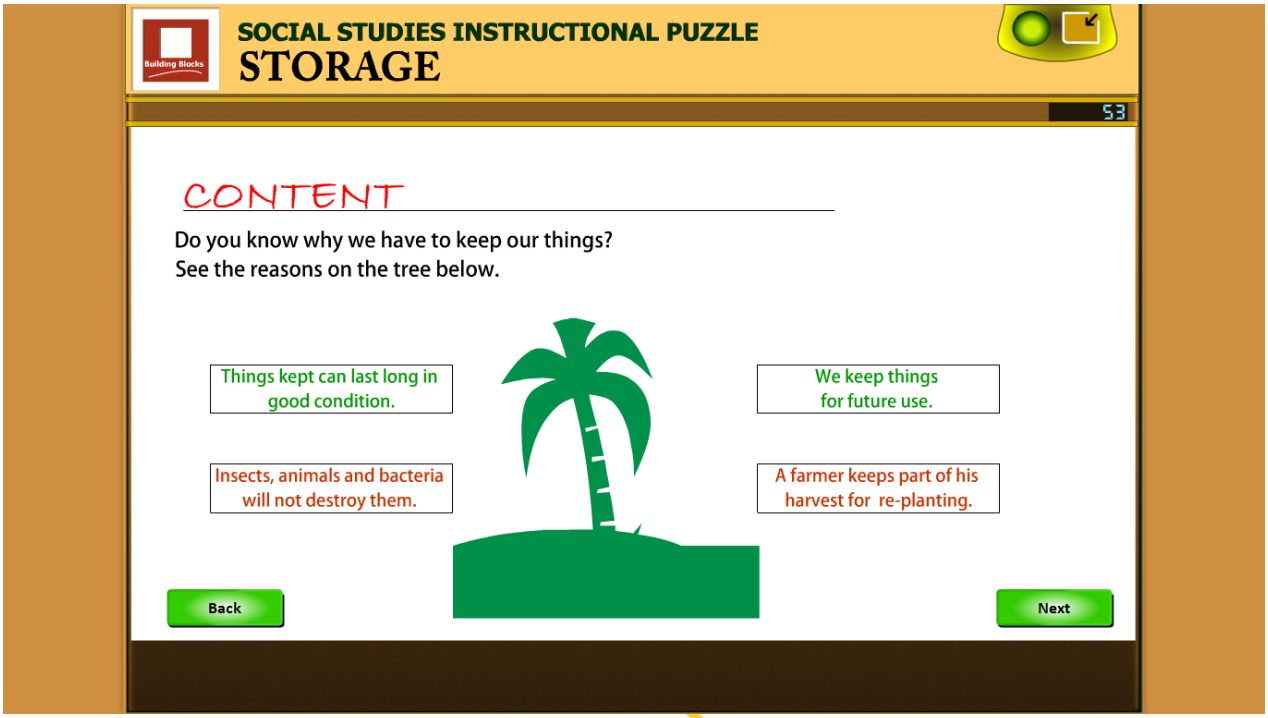
33980

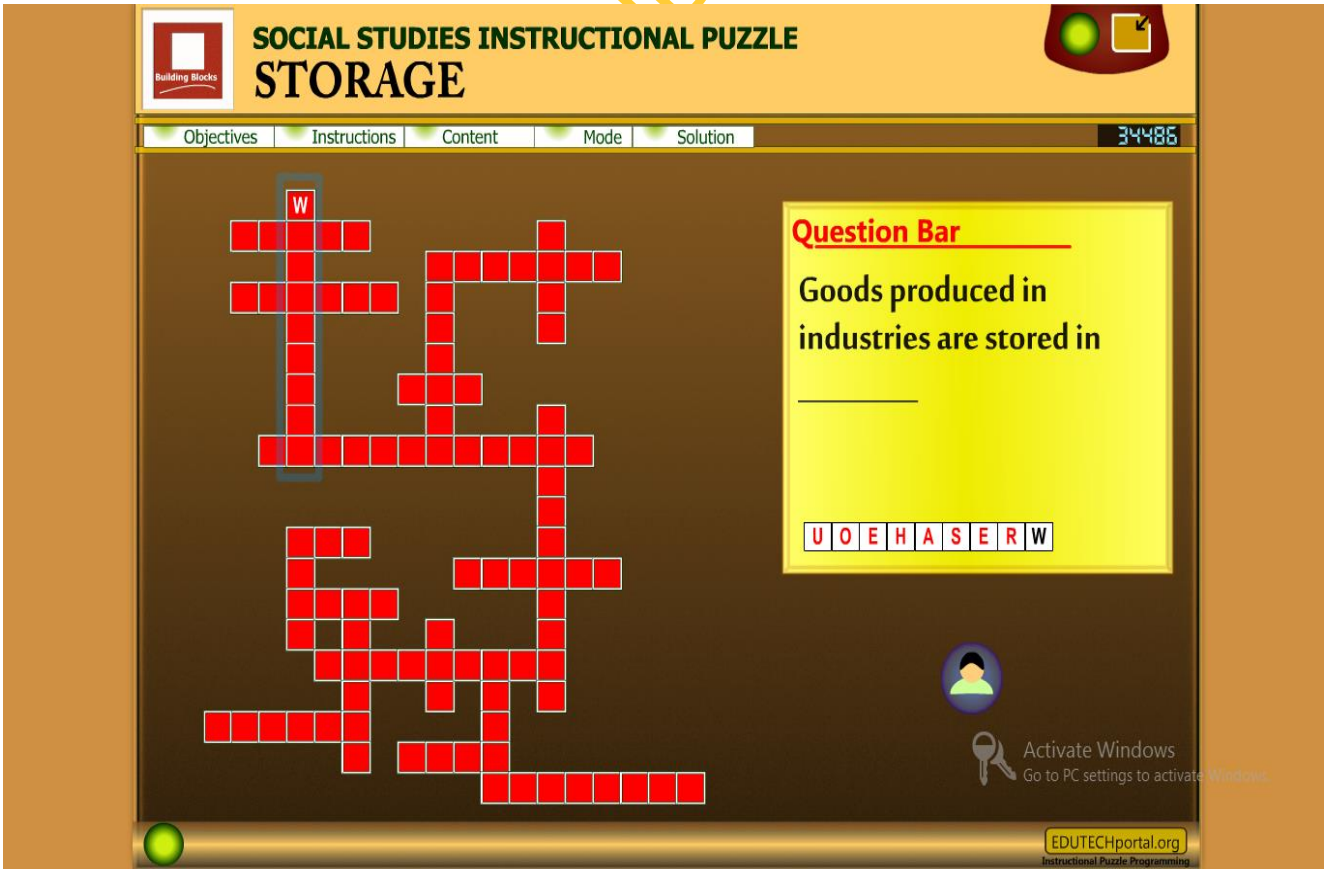
Ways of storing things

(6) Smoking: This is a traditional food preservation method whereby you dry food like fish through smoke from fire.

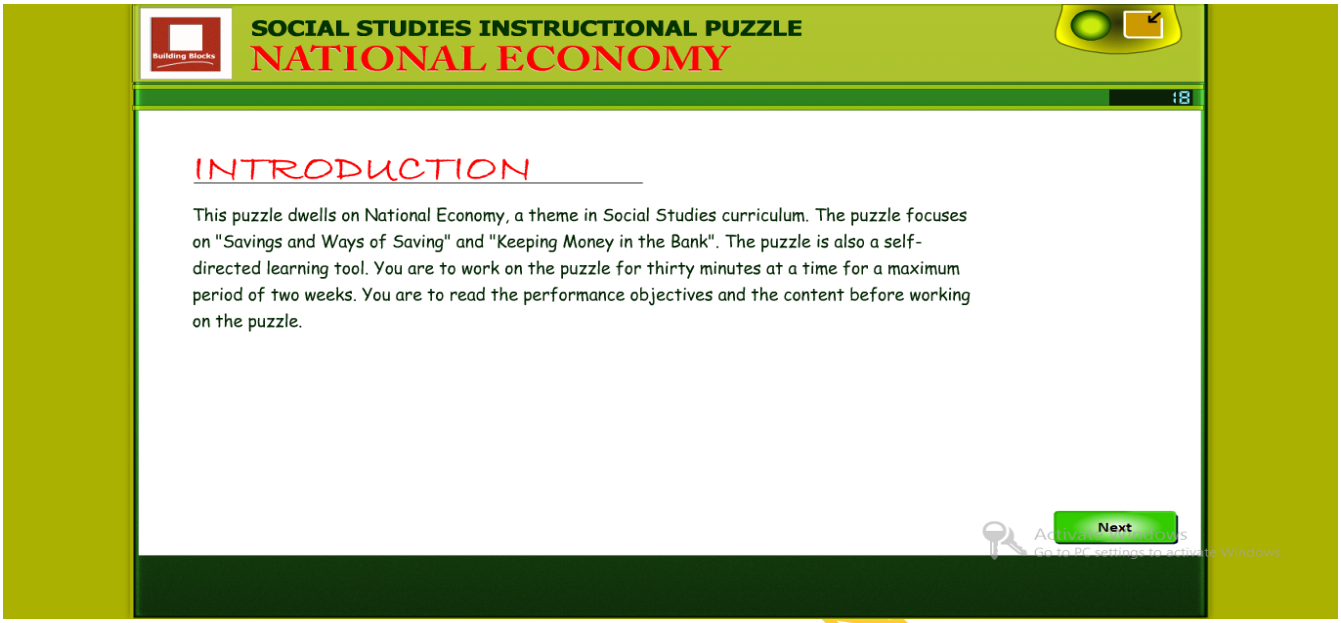
This woman is smoking fish.

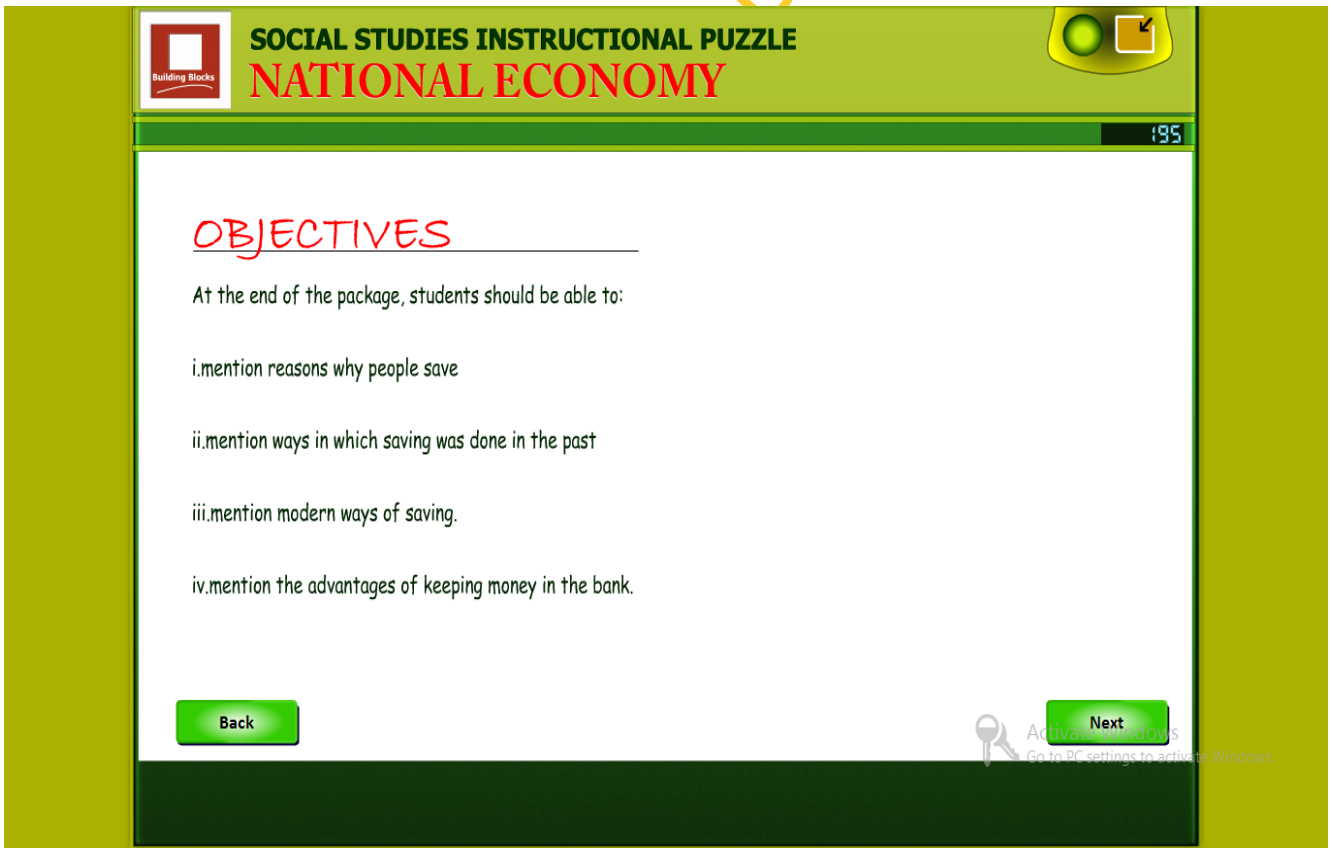
Back Next

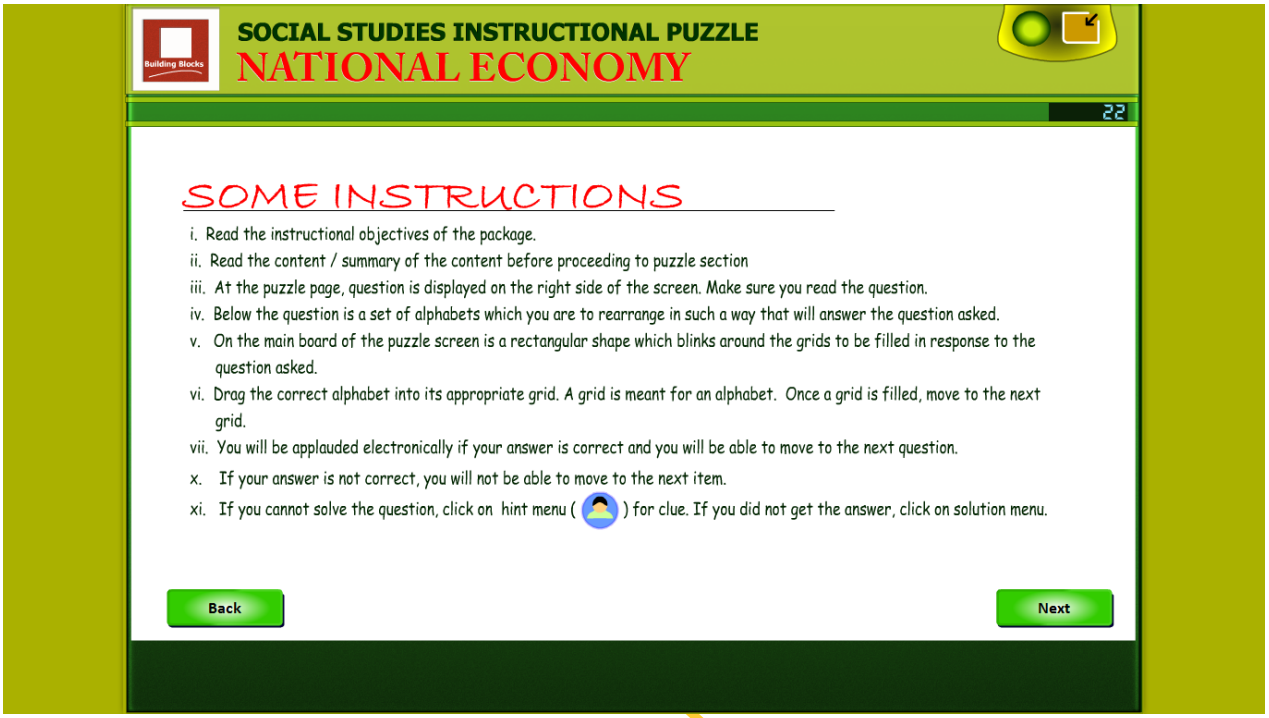

SOCIAL STUDIES INSTRUCTIONAL PUZZLE
STORAGE
53
CONTENT
Do you know why we have to keep our things?
See the reasons on the tree below.
Things kept can last long in good condition.
We keep things for future use.
Insects, animals and bacteria will not destroy them.
A farmer keeps part of his harvest for re-planting.
Back
Next

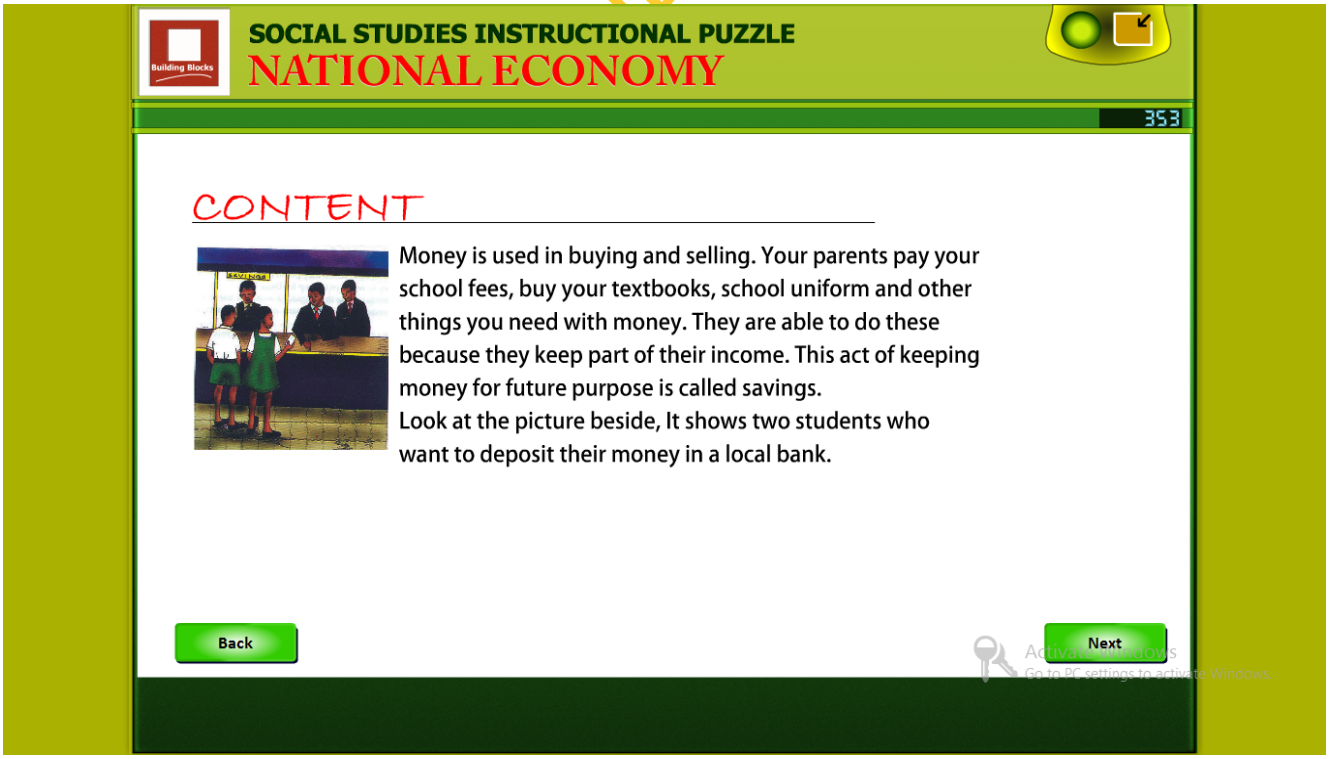

SOCIAL STUDIES INSTRUCTIONAL PUZZLE
STORAGE
Objectives
Instructions
Content
Mode
Solution
34486
Question Bar
Goods produced in industries are stored in
U O E H A S E R W
Activate Windows
EDUTECHportal.org

Weeks 5-6


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY
:8
INTRODUCTION
This puzzle dwells on National Economy, a theme in Social Studies curriculum. The puzzle focuses on "Savings and Ways of Saving" and "Keeping Money in the Bank". The puzzle is also a self-directed learning tool. You are to work on the puzzle for thirty minutes at a time for a maximum period of two weeks. You are to read the performance objectives and the content before working on the puzzle.
Next


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY
:95
OBJECTIVES
At the end of the package, students should be able to:
i.mention reasons why people save
ii.mention ways in which saving was done in the past
iii.mention modern ways of saving.
iv.mention the advantages of keeping money in the bank.
Back
Next


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY
22
SOME INSTRUCTIONS
i. Read the instructional objectives of the package.
ii. Read the content / summary of the content before proceeding to puzzle section
iii. At the puzzle page, question is displayed on the right side of the screen. Make sure you read the question.
iv. Below the question is a set of alphabets which you are to rearrange in such a way that will answer the question asked.
v. On the main board of the puzzle screen is a rectangular shape which blinks around the grids to be filled in response to the question asked.
vi. Drag the correct alphabet into its appropriate grid. A grid is meant for an alphabet. Once a grid is filled, move to the next grid.
vii. You will be applauded electronically if your answer is correct and you will be able to move to the next question.
x. If your answer is not correct, you will not be able to move to the next item.
xi. If you cannot solve the question, click on hint menu ( ) for clue. If you did not get the answer, click on solution menu.
Back
Next


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY
353
CONTENT
Money is used in buying and selling. Your parents pay your school fees, buy your textbooks, school uniform and other things you need with money. They are able to do these because they keep part of their income. This act of keeping money for future purpose is called savings.
Look at the picture beside, It shows two students who want to deposit their money in a local bank.
Back
Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

NATIONAL ECONOMY

24

CONTENT

Look at the picture below, it is the Central Bank of Nigeria, Abuja. The Central Bank is the highest bank in Nigeria, it belongs to the federal government.

Back Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

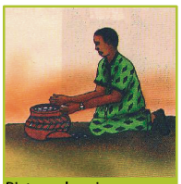
NATIONAL ECONOMY

846

CONTENT

Saving money in banks is a modern way of saving.
In the olden day, people saved their money by:

(i) Keeping it with relations
(ii) Keeping it with money keeper
(iii) Keeping it under sleeping mat
(iv) Keeping money inside clay pot



Picture showing a man keeping money inside a clay pot.

Back Next

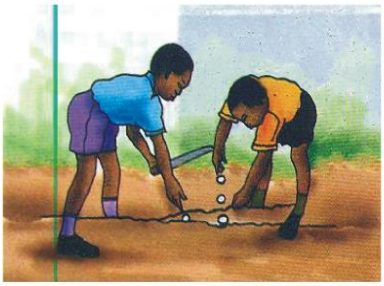
SOCIAL STUDIES INSTRUCTIONAL PUZZLE

NATIONAL ECONOMY

754

CONTENT

Burying money in the ground. Look at the picture below, the people dug the ground and are keeping money there. They will cover the pit with sand after putting the money there.



Back

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

NATIONAL ECONOMY

838

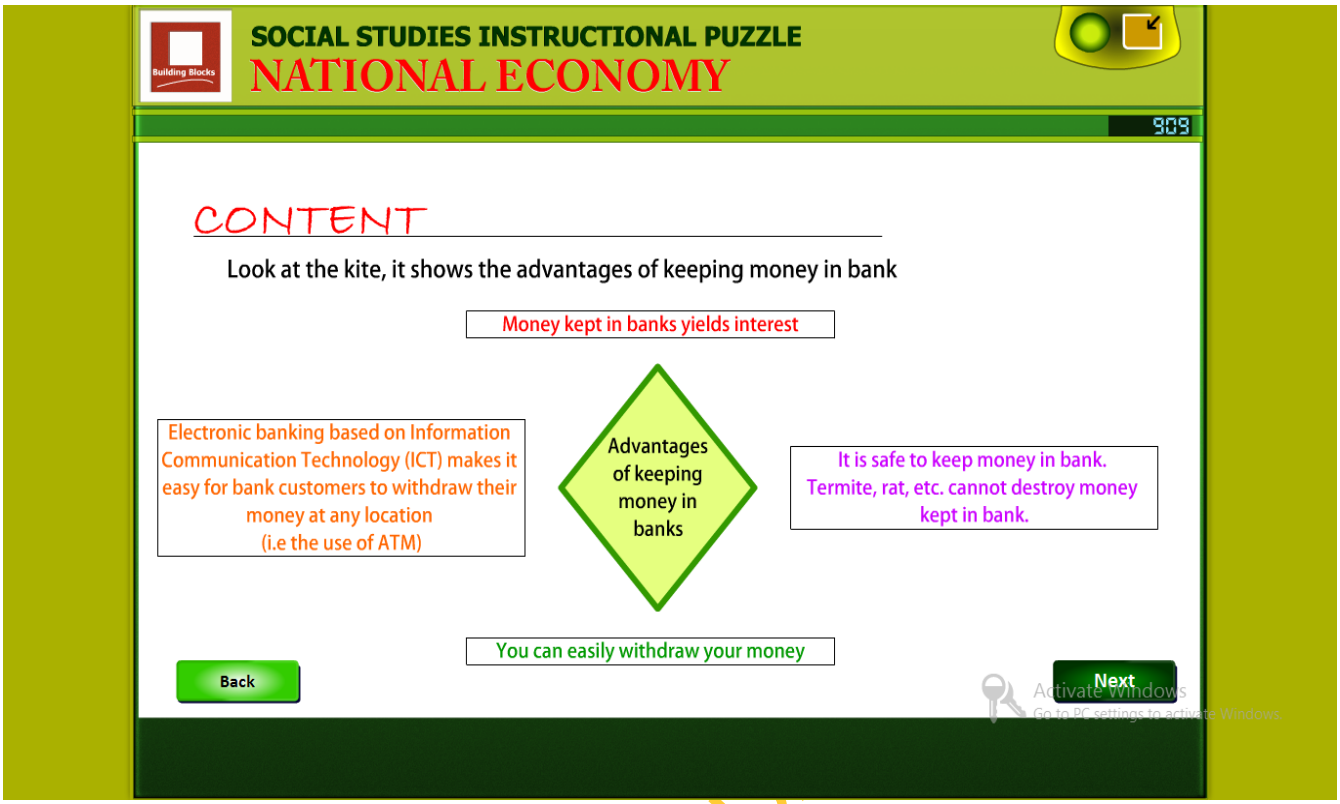
CONTENT

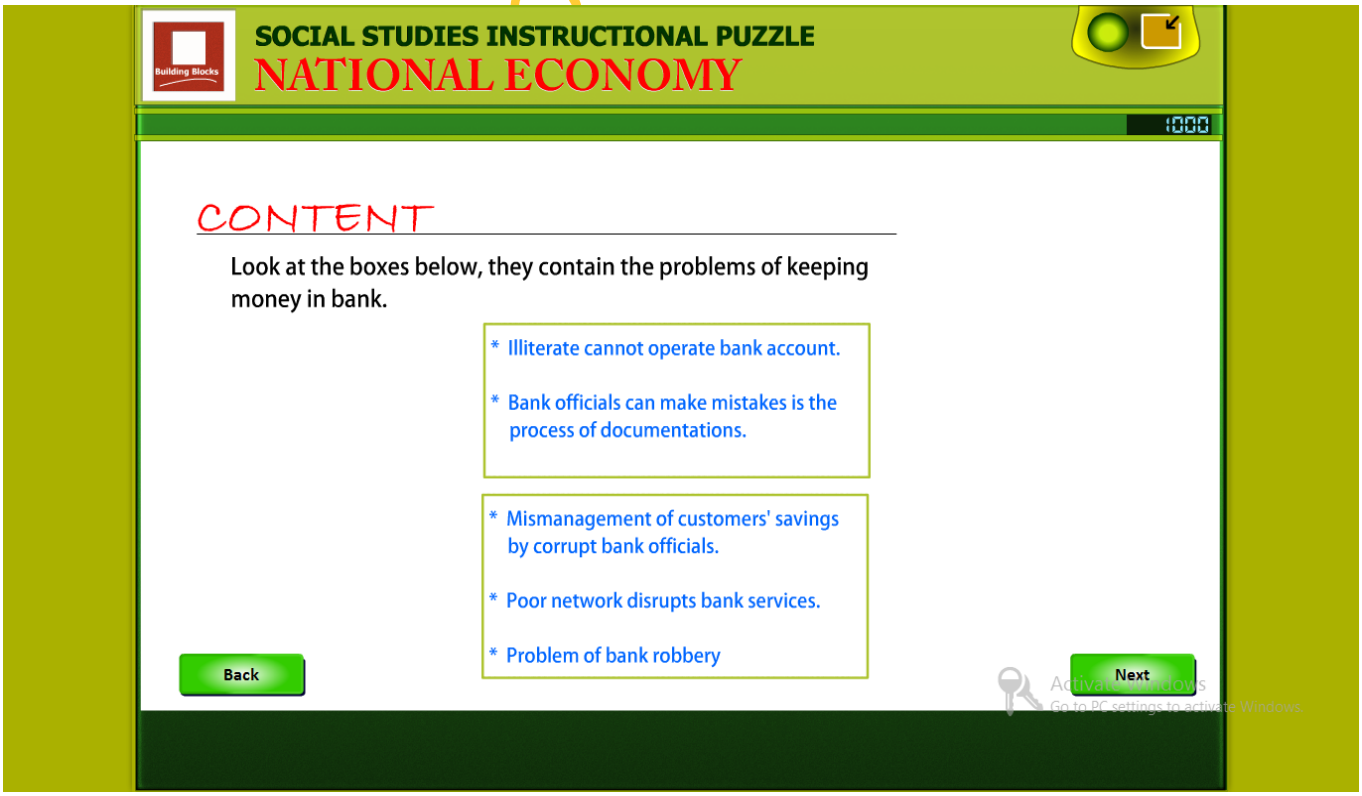
Modern ways of saving money

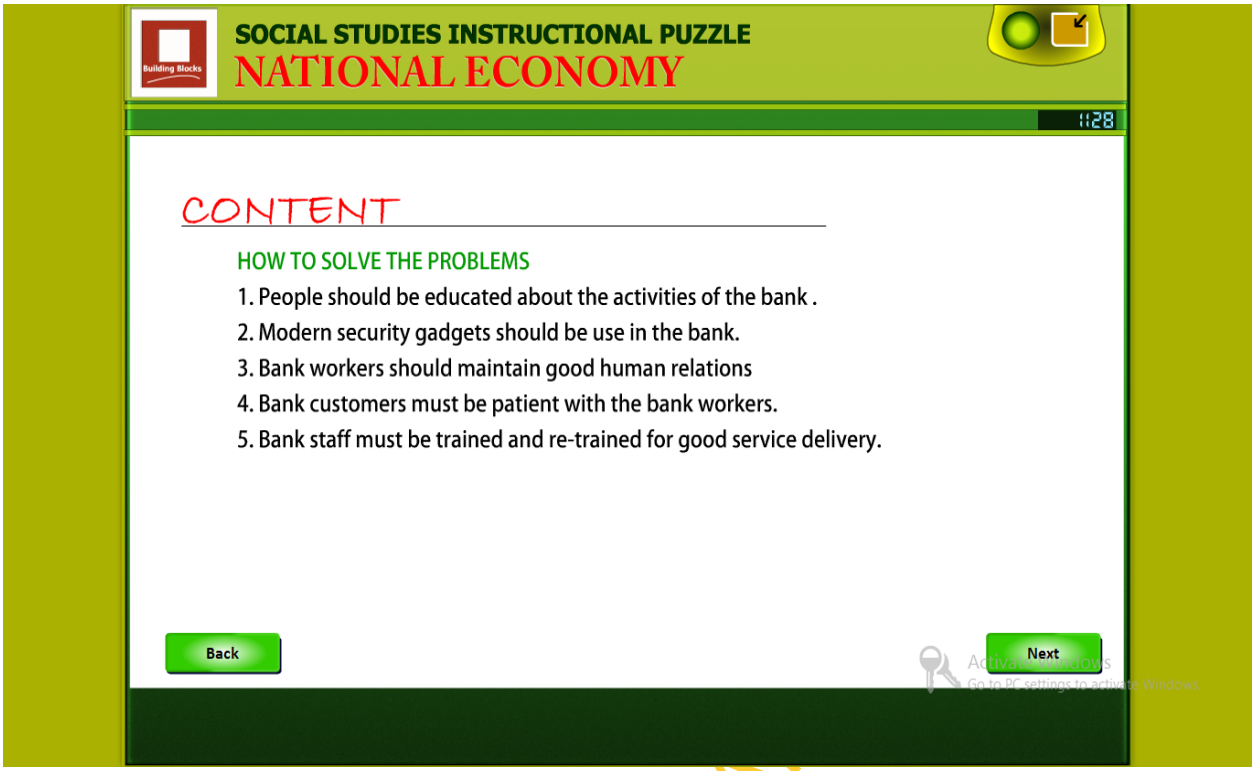
(i) You can save your money in the bank.
(ii) You can buy shares and stocks with your money. This method of saving is a form of investment. That is, your money is used in producing goods and services. You share part of the profit made from the sales of the goods and services produced.
(iii) Have you heard of co-operative society? Is any of your parents a member of any cooperative society? Cooperative society is a modern way of saving money
(iv) Money can also be saved in micro finance houses. Micro finance houses give loans to their customers at low interest rate.

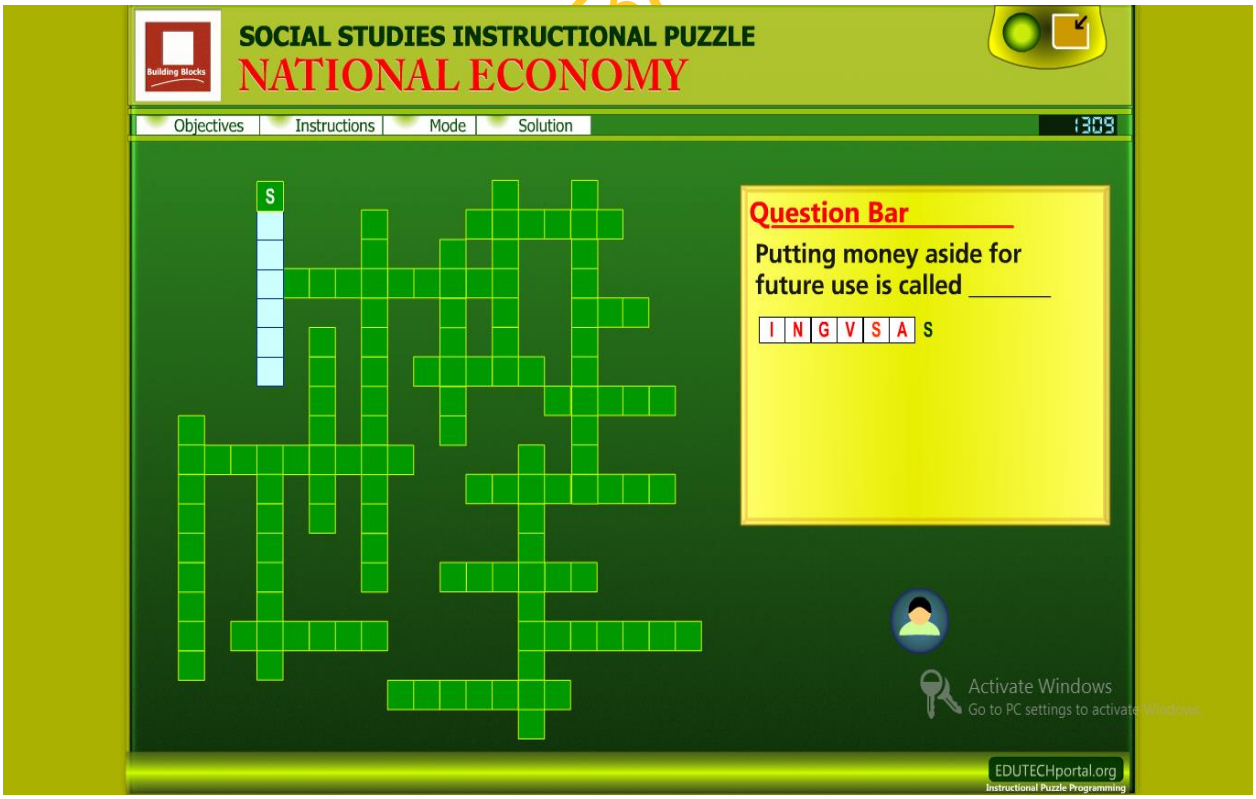
Back

Next

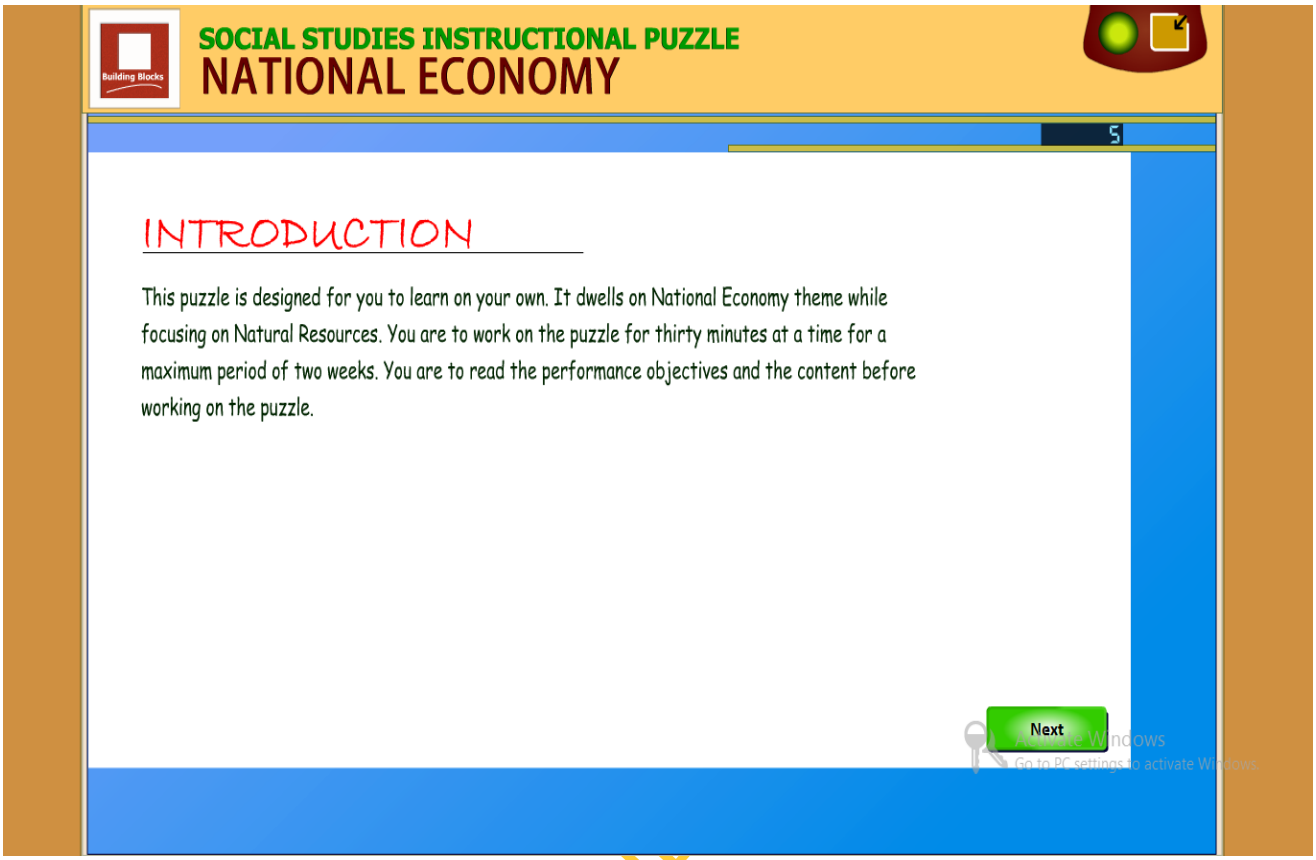

SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY
CONTENT
Look at the kite, it shows the advantages of keeping money in bank
Money kept in banks yields interest
Electronic banking based on Information Communication Technology (ICT) makes it easy for bank customers to withdraw their money at any location (i.e the use of ATM)
Advantages of keeping money in banks
It is safe to keep money in bank. Termite, rat, etc. cannot destroy money kept in bank.
You can easily withdraw your money
Back
Next

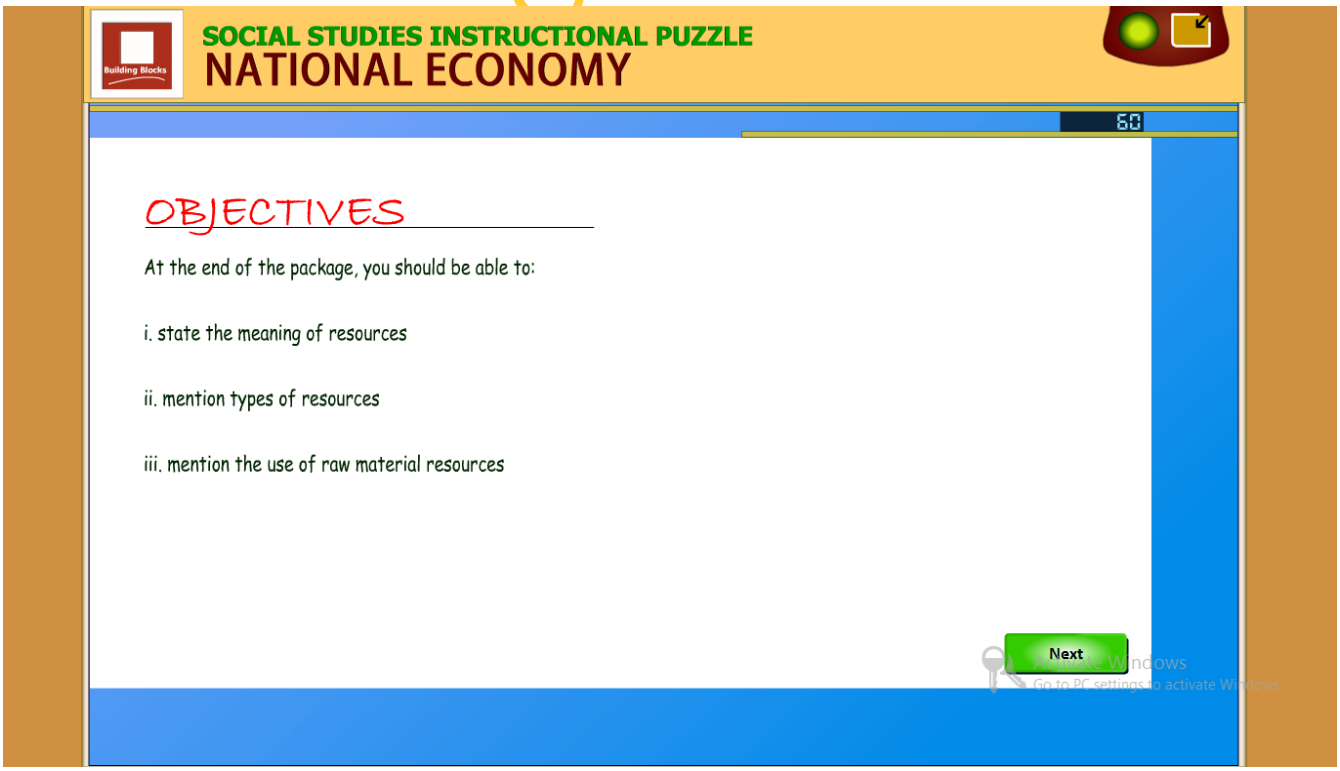

SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY
CONTENT
Look at the boxes below, they contain the problems of keeping money in bank.
* Illiterate cannot operate bank account.
* Bank officials can make mistakes is the process of documentations.
* Mismanagement of customers' savings by corrupt bank officials.
* Poor network disrupts bank services.
* Problem of bank robbery
Back
Next


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY
1:28
CONTENT
HOW TO SOLVE THE PROBLEMS
1. People should be educated about the activities of the bank .
2. Modern security gadgets should be use in the bank.
3. Bank workers should maintain good human relations
4. Bank customers must be patient with the bank workers.
5. Bank staff must be trained and re-trained for good service delivery.
Back
Next


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY
Objectives
Instructions
Mode
Solution
1:30:9
S
Question Bar
Putting money aside for future use is called _____
I N G V S A S
Activate Windows
Go to PC settings to activate Windows.
EDUTECHportal.org
Instructional Puzzle Programming

Weeks 7-8


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY
5
INTRODUCTION
This puzzle is designed for you to learn on your own. It dwells on National Economy theme while focusing on Natural Resources. You are to work on the puzzle for thirty minutes at a time for a maximum period of two weeks. You are to read the performance objectives and the content before working on the puzzle.
Next


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY
60
OBJECTIVES
At the end of the package, you should be able to:
i. state the meaning of resources
ii. mention types of resources
iii. mention the use of raw material resources
Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

NATIONAL ECONOMY

185

SOME INSTRUCTIONS

i. Read the instructional objectives of the package.

ii. Read the content of the content before proceeding to puzzle section

iii. At the puzzle page, question is displayed on the right side of the screen. Make sure you read the question.

iv. Below the puzzle pane is a set of alphabets which you are to rearrange in such a way that will answer the question asked.

v. On the main board of the puzzle, blue colour will appear on the grids to be filled in response to the question asked.

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

NATIONAL ECONOMY

247

SOME INSTRUCTIONS

vi. Drag the correct alphabet into its appropriate grid. A grid is meant for an alphabet. Once a grid is filled, move to the next grid.

vii. You will be applauded electronically if your answer is correct and you will be able to move to the next question.

viii. If your answer is not correct, you will not be able to move to the next item.

ix. If you cannot solve the question, click on the hint menu ( ) for clue. If you did not get the answer, click on the solution menu to the question displayed.

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

NATIONAL ECONOMY

540

CONTENT ON RESOURCES

A sample of heavy crude oil: petrol, diesel, engine oil, kerosene are derived from it.

Back

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

NATIONAL ECONOMY

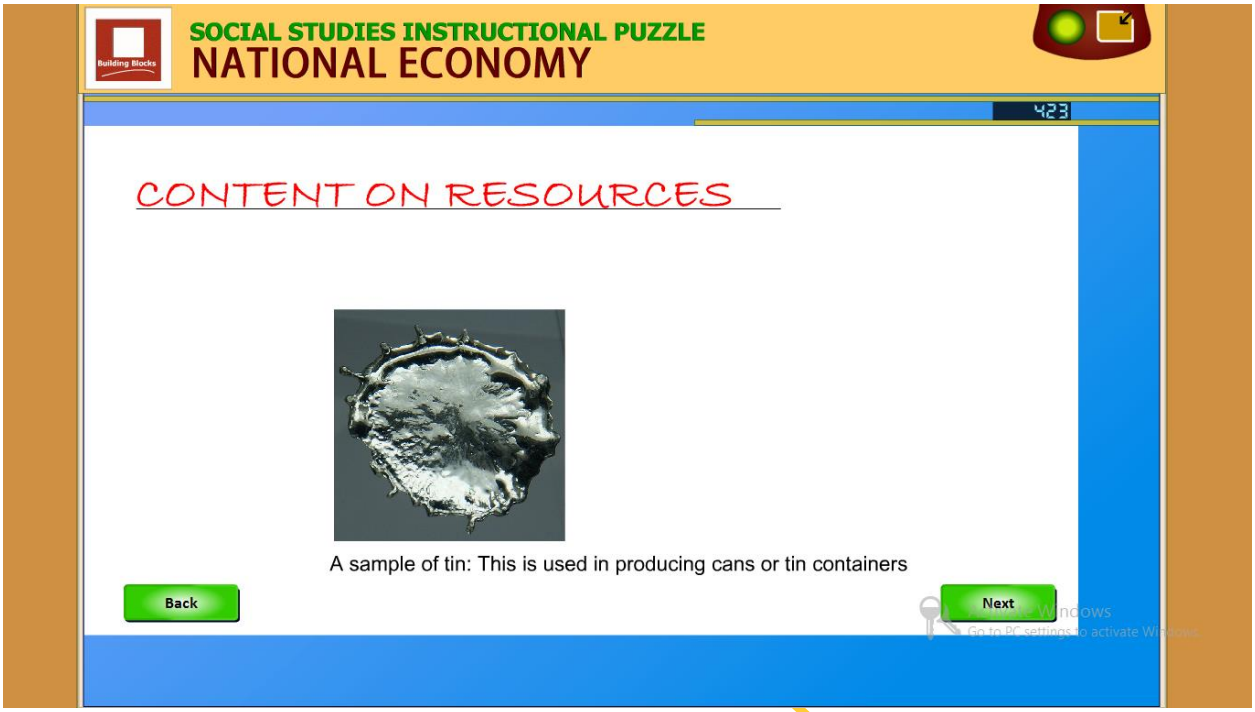
312

FULL CONTENT ON RESOURCES

Look at the pictures that follow, they are different types of resources in Nigeria. These resources are used by human being to produce goods and services.

Back

Next



SOCIAL STUDIES INSTRUCTIONAL PUZZLE

NATIONAL ECONOMY

785

CONTENT ON RESOURCES

Stockpile of iron ore pellets: This is used in producing all iron or steel objects

Back

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

NATIONAL ECONOMY

890

CONTENT ON RESOURCES

Water resources: These consist of lakes, rivers, oceans, seas etc. Water resources are used for fish farming, water for domestic use and water transportation.

Back

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY

CONTENT ON RESOURCES

Forest resources: Timbers used in making planks, furniture at home, canoes and all wooden materials are derived from forest.

Back

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY

CONTENT ON RESOURCES

Coal: This is a source of power for domestic and industrial use

Back

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

NATIONAL ECONOMY

1:352

TYPES OF RESOURCES

1. Human resources. E .g: teacher, lawyers, doctors, engineer, drivers, carpenters, traders etc.
2. Agricultural resources. E. g: timbers, animals, fishes, grass, crops.
3. Capital resources. E. g: machines, factories, building, industries.
4. Mineral resources. E .g: natural gas, crude oil, iron ore, gold, limestone, clay, tin, coal, e.t.c
5. Water resources. E .g: oceans, seas, rivers, streams, springs, lake, e.t.c

Back

Next

SOCIAL STUDIES INSTRUCTIONAL PUZZLE

NATIONAL ECONOMY

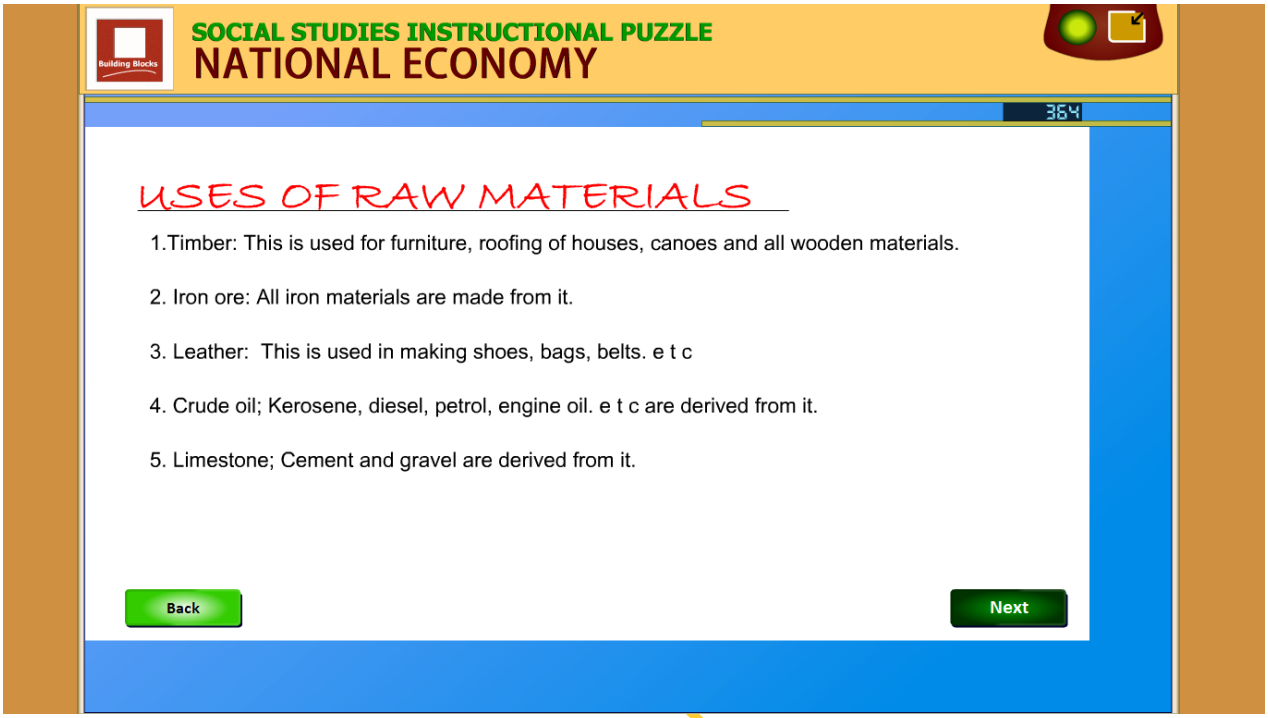
1:48

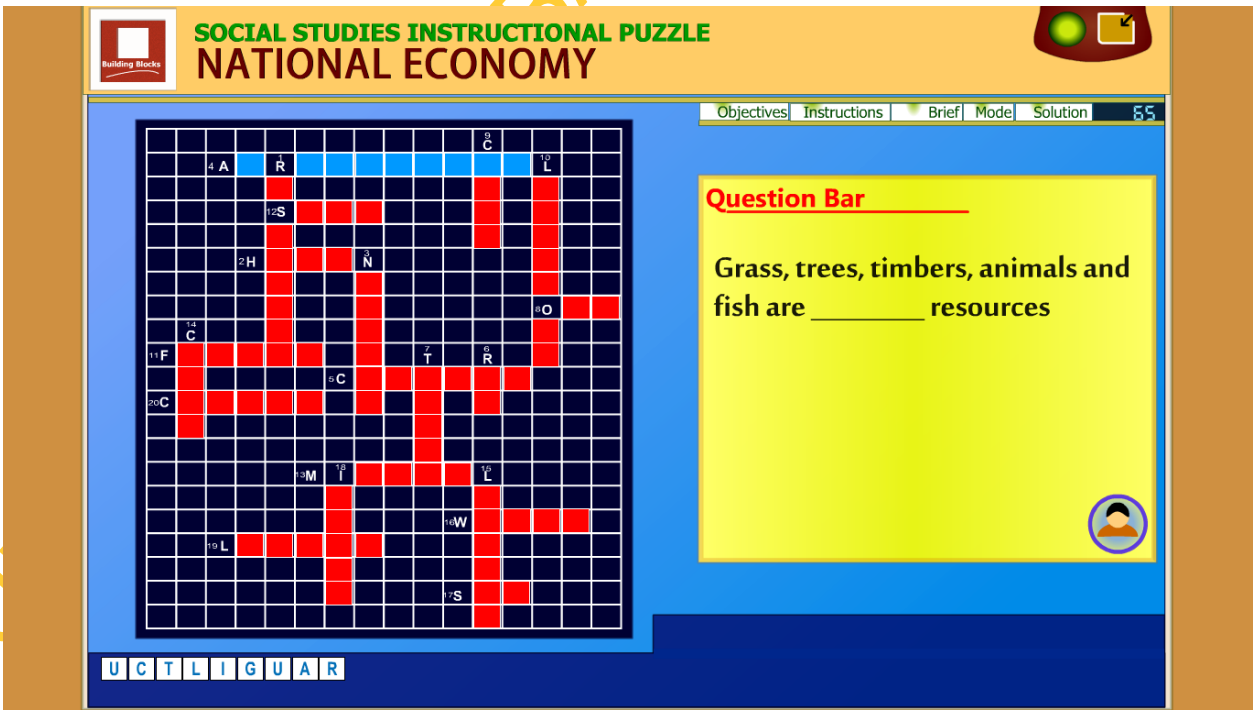
CONTENT ON RESOURCES

Lime stone: Cement and gravel for building houses, construction of road and bridges are got from it.

Back

Next


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY
364
USES OF RAW MATERIALS
1.Timber: This is used for furniture, roofing of houses, canoes and all wooden materials.
2. Iron ore: All iron materials are made from it.
3. Leather: This is used in making shoes, bags, belts. e t c
4. Crude oil; Kerosene, diesel, petrol, engine oil. e t c are derived from it.
5. Limestone; Cement and gravel are derived from it.
Back
Next


SOCIAL STUDIES INSTRUCTIONAL PUZZLE
NATIONAL ECONOMY
Objectives
Instructions
Brief
Mode
Solution
85
Question Bar
Grass, trees, timbers, animals and fish are _____ resources
U C T L I G U A R

APPENDIX VI I

INSTRUCTIONAL GUIDE ON CONVENTIONAL TEACHING STRATEGY

This guide was used for each of the topics.

PRESENTATION

STEP I: The teacher should;

(i) take attendance of the students

(ii) write the topic on the chalk board

(iii) write the sub-topic on the chalk board

(iv) state the learning objectives for the topic

STEP II Strategy implementation: Teacher should;

(i) ask questions from the students based on the previous knowledge

(ii) do a brief review of the last lesson

(iii) discuss the topic step by step making use of the instructional materials provided by the researcher

(iv) allow the students to ask questions

Evaluation

The teacher should ask questions from the students based on the stipulated objectives of the topic.

Assignment: Teacher gives class assignment.

APPENDIX VIII

INSTRUCTIONAL GUIDE ON THE COMPUTER-BASED SELF-LEARNING INSTRUCTIONAL PUZZLES

This guide was used in the experimental group.

Steps : The teacher should;

(i) take the attendance of the students

(ii) allot computer system to each of the learners

(iii) instruct the students to put on the computer, open the package and work on the package

(iv) move round the class to make sure the students are working on the package

(v) make sure that the computers used are switched off at the expiration of the duration for the lesson

(vi) make sure the students return to their classroom after the lesson

APPENDIX IX

A copy of lesson note on each of the topics

Week 1

Topic: Home Appliances

Duration: 120 minutes

Instructional material: Pictures and real objects such as electric iron, electric cooker, stove etc

Instructional objectives: At the end of the lesson, the students should be able to:

i. give the meaning of home appliances

ii. mention some electrical appliances and their use at homes

Previous knowledge: Students are familiar with some appliances used at home boiling ring, stove, refrigerator etc

Presentation:

Step i: Teacher revises the previous topic with the students.

Step ii: The teacher writes the topic for the lesson on the board and states the behavioural objectives

Step iii: The teacher asks the students to mention some gadgets that are available in their homes.

Step iv: The teacher leads the students to define home appliances.

Step v: The teacher instructs the students to mention some electrical appliances and what they are used for.

Step vi: The teacher explains what home and electrical appliances are with relevant pictures

Step vii: The teacher gives further explanation on the uses of some electrical appliances

Step viii: Students are allowed to ask questions while the teacher responds

Step ix: The teacher gives note on the topic to the students

Evaluation: The teacher asks the students to:

i. Define home appliances

ii. Mention five electrical appliances at home and their uses

Summary: The teacher gives a brief review of the lesson

Assignment: Teacher gives take home assignment to the students.

Week 2

Topic: Home Appliances

Sub topic: Dangers in the wrong use of appliances

Duration: 120 minutes

Instructional material: Pictures showing people using some electrical appliances

Instructional objectives: At the end of the lesson, the students should be able to:

i. identify the dangers of the wrong uses of electrical appliances

ii. demonstrate correct use of electrical appliances.

Previous knowledge: Students are aware of electric shock

Presentation:

Step i: Teacher revises the previous topic with the students

Step ii: The teacher writes the topic for the lesson on the board and states the behavioural objectives

Step iii: The teacher asks the students to mention some electrical appliances in their homes.

Step iv: the students are asked to suggest what could happen if electrical appliances are not well used

Step v: The teacher explains the danger that are in the wrong use of appliances.

Step vi: The teacher leads the students to discuss how to use electrical appliances correctly.

Step vii: Students are allowed to ask questions while the teacher responds

Step viii: The teacher gives note on the topic for the students to copy

Evaluation: The teacher asks the students to:

i. identify at two dangers of the wrong use of appliances

ii. mention way of using home appliances correctly

Summary: The teacher gives a brief review of the lesson

Assignment: Teacher gives take home assignment to the students.

Week 3

Topic: Storage

Sub topic: Meaning and ways of storage

Duration: 120 minutes

Instructional material: Pictures showing different storage facilities e.g book shelve, refrigerator etc

Instructional objectives: At the end of the lesson, the students should be able to:

i. explain the meaning of storage

ii. mention ways of storing things now and in the past

Previous knowledge: Students are familiar with some storage facilities e.g refrigerator

Presentation:

Step i: Teacher revises the previous topic with the students

Step ii: The teacher writes the topic for the lesson on the board and states the behavioural objectives

Step iii: The teacher asks the students to mention some storage facilities they have at homes.

Step iv: The teacher leads the students to define storage facilities used

Step v: The teacher shows the students the pictures of some ways of storing things in the past and in modern time e.g drying, smoking, sealing, bagging etc

Step vi: The teacher allows the students to ask questions while the teacher respond

Evaluation: The teacher asks the students to:

i. explain the meaning of storage

ii. mention ways of storing things now and in the past

iii. mention way of using home appliances correctly

Summary: The teacher gives a brief review of the lesson

Assignment: Teacher gives take home assignment to the students.

Week 4

Topic: Things we store and why we store them

Duration: 120 minutes

Instructional material: Pictures showing modern ways of storing things

Instructional objectives: At the end of the lesson, the students should be able to:

i. mention the things we store

ii. mention one reason for storing things properly

Previous knowledge: Students are familiar with keeping their books in their bags

Presentation:

Step i: Teacher revises the previous topic with the students.

Step ii: The teacher writes the topic for the lesson on the board and states the behavioural objectives

Step iii: The teacher asks the students some things that can be stored.

Step iv: The teacher leads the students to identify things that can be stored e.g meet, yam, Vegetable etc.

Step v: The teacher asked the students to suggest reasons for storing things

Step vi: The teacher explains some reasons for storing things

Step vii: Students are allowed to ask questions while the teacher responds

Step viii: The teacher gives note on the topic to the students

Evaluation: The teacher asks the students to:

i. Mention things that we store

ii. Mention one reason for storing things properly

Summary: The teacher gives a brief review of the lesson

Assignment: Teacher gives take home assignment to the students.

Week 5

Topic: Savings and ways of savings

Duration: 120 minutes

Instructional material: Pictures showing ways of saving money in the past etc

Instructional objectives: At the end of the lesson, the students should be able to:

i. Mention reasons why people save
ii. mention ways in which saving was done in the past
iii. mention modern ways of saving

Previous knowledge: Students are familiar with saving money in the bank

Presentation:

Step i: Teacher revises the previous topic with the students.

Step ii: The teacher writes the topic for the lesson on the board and states the behavioural objectives

Step iii: The teacher asks the students to state the reason for keeping money in banks.

Step iv: The teacher explains the reason for saving.

Step v: The teacher explains

Step vi: The teacher explains the ways saving was done in the past with relevant pictures

Step viii: The teacher leads the students to identify modern ways of saving

Step viii: Students are allowed to ask questions while the teacher responds

Step ix: The teacher gives note on the topic to the students

Evaluation: The teacher asks the students to:

i. mention some reasons why people save
ii. mention some ways in which saving way done in the past
iii. mention some modern ways of saving

Summary: The teacher gives a brief review of the lesson

Assignment: Teacher gives take home assignment to the students.

Week 6

Topic: Keeping money in bank

Duration: 120 minutes

Instructional material: Picture showing a bank etc

Instructional objectives: At the end of the lesson, the students should be able to:

i. Mention the advantages of keeping money in bank

ii. Mention the problems and solutions of saving money in the bank

Previous knowledge: Students are familiar with saving money in the bank

Presentation:

Step i: Teacher revises the previous topic with the students.

Step ii: The teacher writes the topic for the lesson on the board and states the behavioural objectives

Step iii: The teacher leads the students to identify the advantages of keeping money in bank.

Step iv: The teacher explains the problems of keeping money in bank.

Step v: The teacher leads the students to suggest solutions to the problems

Step vi: Students are allowed to ask questions while the teacher responds

Step vii: The teacher gives note on the topic to the students

Evaluation: The teacher asks the following questions from the students.

i. Mention some reasons why people keep money in the bank

ii Mention some problems of saving money in the bank

ii. Suggest some solutions to the problems

Summary: The teacher gives a brief review of the lesson

Assignment: Teacher gives take home assignment to the students.

Week 7

Topic: Resources

Duration: 120 minutes

Instructional material: Picture showing different types of resources in Nigeria

Instructional objectives: At the end of the lesson, the students should be able to:

i. State the meaning of resources

ii. Mention types of resources

Previous knowledge: Students are aware of some mineral resources in Nigeria

Presentation:

Step i: Teacher revises the previous topic with the students.

Step ii: The teacher writes the topic for the lesson on the board and states the behavioural objectives

Step iii: The teacher asks the students to mention some mineral resources in Nigeria

Step iv: The teacher explains what resources are to the students.

Step v: The lists and explains the various type of resources in Nigeria to the students

Step vi: Students are allowed to ask questions while the teacher reacts

Step vii: The teacher gives note on the topic to the students

Evaluation: The teacher asks the following questions from the students.

i. State the meaning of resources

ii give two examples of resources

Summary: The teacher gives a brief review of the lesson

Assignment: Teacher gives take home assignment to the students.

Week 8

Topic: Resources

Sub topic: Uses of raw material resources

Duration: 120 minutes

Instructional material: Picture showing different types of raw material resources in Nigeria

Instructional objectives: At the end of the lesson, the students should be able to mention the uses of some raw materials

Previous knowledge: Students are aware of some raw material resources in Nigeria eg forest resources, limestone etc

Step i: Teacher revises the previous topic with the students.

Step ii: The teacher writes the topic for the lesson on the board and states the behavioural objectives

Step iii: The teacher asks the students to mention some raw material resources in Nigeria

Step iv: The teacher leads the students to list some raw material resources in Nigeria.

Step v: The teacher explains the uses of each of the raw materials listed

Step vi: Students are allowed to ask questions while the teacher reacts

Step vii: The teacher gives note on the topic to the students

Evaluation: The teacher asks the following questions from the students.

i. Mention some raw materials in Nigeria

ii. State two uses of each of them

Summary: The teacher gives a brief review of the lesson

Assignment: Teacher gives take home assignment to the students