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GUIDE TO TEACHING GEOGRAPHY FOR ACHIEVING ANALYTICAL THINKING SKILLS AMONG SECONDARY SCHOOL STUDENTS

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ABSTRACT: *Geography is a discipline which has witnessed evolution in purpose, content, method of study and application of knowledge, being a reflection of the changing philosophy and thought of scholars of different periods of time. Geography during the ancient, mediaeval and even the pre-modern periods was largely concerned with the description of places, discoveries of geographical phenomena and drawing of route and place maps. Modern geography's foundation was built on Darwin's theory of evolution, which idea was applied to human society. Consequently such concepts as anthropogeography, social Darwinism, political geography, agricultural geography, economic geography, medical geography, environmental determinism, cultural determinism, applied geography, electoral geography, behavioural geography and quantitative geography, just to mention a few, have emerged as themes of study in the discipline. Hence, geography today is no longer a passive science of description of places on the earth's surface, but an active scientific study immersed in finding solutions to a plethora of human problems. The solution to human problems are only achievable through active teaching of the subject using apposite instructional methods, curriculum contents and objectives, instructional materials and methods of evaluation for teaching and learning. This paper therefore discusses the relevance of some active methods in the context of students' thinking process, particularly higher-order thinking skills, with specific focus on analytical thinking skills. The paper proposes experiential spatial problem based learning (ESPBL) as an instructional model for the teaching of geography at the secondary school level of learning as a means of enhancing analytical thinking skills of students. The author believed that this has the potential for actualizing the objective of geography education in the twenty-first century, which aims is to achieve the sustainable development goal.*

KEYWORDS: Teaching Geography, Analytical Thinking, Secondary School, Students, Sustainable Development Goal

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INTRODUCTION

Through the different periods of history of geography, it has been defined differently by scholars of the different periods which reflected their thought about its purpose, contents and methods, and which also provided a clue on the philosophy and values of people of the different periods.

Geographers of the ancient time saw geography (Singh, 2011a) as the study of the earth's surface whose purpose was to describe its physical features and conditions. During the mediaeval and modern periods, scholars, for instance, Getis A. Getis J, and Fellman (2004) considered geography to be more than descriptive science, but a spatial science discipline concerned with the attribute and use of space, such as spatial pattern of natural resources, human ecology, and man-spatial organization. Singh is of the view that modern Geography is the only discipline that studies the various attributes of the environment in totality as it deals with the spatial attributes of all the phenomena including human beings in a given space and highlights the complex man-environment relationship at various stages in a time space continuum. This conceptualization of Geography (Dakur, 2018) is quite encompassing as it incorporates the ancient and modern ideas about geography, inclusive of objectives appropriate for man to cope with present challenges of global warming, climate change and environmental pollution. Contemporary Geography therefore is not a passive science but an active discipline immersed in the search for solution of human problems as they live on earth's environment. Specific examples of such problems as noted by Ojo (1981) included land use, transportation and traffic, food supply and deficit, resource availability and shortage, transformation of existing economic order to new ones, interaction between man and the environment with all its implications and consequences, and so on. Thus, Geography is a critical component of social and economic processes (Daniels, Bradshaw, Shaw, & Sidaway, 2001), whose purpose is to train learners in practical skills they could apply in the solution of a wide range of human problems.

Varma (2007) aptly posits that the aim of Geography teaching is to provide mental discipline in terms of training the learner's whole mode of thought which in turn influences their intellectual life and studies in the same field. These objectives, varma opined, should be reflected in any worthwhile Geography curriculum at any given level of learning. This suggests strongly that the learning experiences and the teaching and learning process in Geography education should explore not only recall of facts and understanding of concepts or theories but also inculcating high order thinking skills for it to be a relevant discipline in the school curriculum. In this connection, Bednarz, alluded by Virranmaki, Valta-Hulkkonen and Pellikka (2021) states that Geography has three ways of thinking: spatial thinking, geographical thinking, and geospatial thinking, thus giving it the potential to enhance people's thinking and opinion making skills, especially when combining concrete facts with abstract ideas and knowledge gain from geographical research. Bloom taxonomy revised by Anderson and Krathwohl (2001) categorized analytical thinking as higher order thinking skill together with evaluative and creative thinking. It has been suggested (Bijsterbosch, Van der scheer, Kuiper, Vinanmaki, Valta-Hulkkonen & Pellikka, 2021) that teaching and learning of Geography should focus on higher order thinking skills (HOTS) and Metacognitive knowledge because this enhances meaningful learning. The revised Bloom's Taxonomy based on the presentation of Anderson et al. (2001) characterized Remember, Understand and Apply as lower-order thinking skills (LOTS) and Analyze, Evaluate and Create as higher-order thinking skills (HOTS). This paper however focuses on Analyses, defined as the breaking down of a material

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into constituent parts and determining how the parts relate to one another and to the overall structure or purpose. In terms of students' learning outcome, Analyze requires that they should be able to select relevant information from a given material and organize the information to form a coherent conclusion, such that causalities between phenomena or concepts are visible, in addition to analysis of the value of the given material.

Sartika, Susantini and Jatmiko (2019) described analytical thinking in conjunction with evaluative thinking as requisite skills developed by students in various fields of sciences, to include analyzing computer programs, laboratory test results, infographics and so on. The authors believed that analysis is a scientific attitude, process and product subsumed in the scientific methods consisting of three operations viz observation, explaining and testing. Sartika, Susantini and Jatmiko argued that, in natural science, the objective of learning is to develop observation skills, plan investigations, interpret data and draw conclusions which can only be possible with the application of analytical skills. What is explained here is the scientific process skills, described by the authors as the 4A learning models in science education involving phenomenon analysis and analysis of findings, all with the ability to improve the analytical thinking skills of average secondary school students in natural science subjects.

Analytical thinking is a key aspect of geographical thinking skills which students need to apply in their everyday lives to be able to adapt to their social, political, economic and physical environment. Geography is thus more than knowledge of the where of phenomena and events; it goes beyond to search for why phenomena and events are where they are, how they are related to one another, what changes have occurred, how the changes and relations can be modified or mitigated, and so on. These are closely related to the student's ability to establish cause-effect relationship between phenomena and events which draws strength from their ability to develop higher order thinking skills (HOTS), analytical thinking inclusive. This is possible in the study of Geography (Balcogullari, 2017) if students examine their environment with scientific methods. The author opined thus: Geography lessons should include selection, investigation and assessment of knowledge. Alluding to the joint committee on elementary and secondary geographic education of the association of American geographers and national council for geography education, Cukurova listed five stages for the application of geographic thinking skills, also known as geographic inquiry, viz:

1. Asking geographic questions,
2. Acquiring geographic information,
3. Organising geographic information,
4. Analysing geographic information and
5. Answering geographic questions.

This paper does not treat all the aspects of thinking in detail; rather, it concentrates discourse more on analysis without disconnecting the link between it and other aspects of geographical thinking because it is not possible to treat any one in isolation.

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What Is Analytical Thinking?

The new international websters comprehensive dictionary conceptualizes analysis as the resolution of a whole into parts or elements. Analytical thinking (Spaska, Salvishchenko, Komar, Gritchenko, & Maidanyk, 2021) is conceptualized as integrated ability that combines elements such as Search, Selection and Categorization of the relevant data and information and further presenting it through infographics; identification of the most likely cause(s) and logical outcome(s) of the problem; and the suggestion of the solution or alternative approaches to resolve the complex problem based on cross disciplinary findings from the data, which is followed by evaluating those solutions and making decisions(s) on the most effective one(s) in preventing the problem from taking place either partially or totally. This means that four things are involved in analytical thinking, namely:

1. Identification of problem
2. Search for and collection of data
3. Analysis and evaluation of data
4. Conclusions and making decisions on the solution of the identified problem.

This clearly signifies that analytical thinking is inquiry-based thinking, a hallmark of scientific investigation that is never devoid of the reasoning embedded in any form of research. The analytical process in step four requires higher-order thinking including the ability to establish relationships between phenomena, an integral part of geographical thinking.

Analytical thinking is a reasoning outcome form of learning that stimulates critical thinking skills, problem solving skills, and creative thinking skills (Areesophonpichet, 2013) pursued in some educational programmes to develop higher-order thinking skills of learners (Anada & Nofrion, 2019). Higher-order thinking skills, as a component of analytical thinking, is defined by Anada and Nofrion as the use of complex thinking and different approaches to complete tasks with many solutions. The authors stressed that higher-order thinking is characterized by the student's ability to analyse, reason, evaluate, create and solve problems based on information that has been owned correctly and efficiently and collaboratively. In summary, analytical thinking involves the student's ability to break and differentiate parts of a whole, identity relationships between different parts of the whole, search for principles of relationship between elements of the entity, engage in scientific inquiry to solve an identified problem, and so on.

Pedagogical Models for the Development of Analytical Thinking Skills

There is research in Nigeria and elsewhere in the world that revealed several teaching approaches that enhance the development of analytical thinking skills of students. The list is long but for the purpose of this paper, only seven of them are discussed briefly; these include: guided inquiry, problem based learning (PBL), context based learning, group investigation, concept mapping, spatial problem based learning (SPBL) and experimental learning.

Guided inquiry is a way of seeking understanding of the world around students by carrying out a step-by-step investigation under the guidance of the teacher. The step to follow in guided inquiry includes identification or location of the problem or issue of concern, statement of investigative questions and hypothesis, collection of information on the problem, analysing

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the information, verifying results and generalizing or making references, and drawing conclusions. This process if conscientiously followed could improve the student's analytical thinking skills. This is defined by Mathew, referenced in Cahyati and Subali (2002) as a model of learning that allows students to move step-by-step from identifying problems, defining hypotheses, formulating problems, collecting data, verifying results and generalising conclusions.

Problem-based learning has wide applicability in different fields of learning and has been proven effective in promoting critical thinking and problem solving in authentic learning situations (Yew & Goh, 2016).

The philosophical assumption in PBL is that learners can construct knowledge through self-directed, collaborative activities. In this case, students are oriented on a given problem and given the opportunity to think over and conjure connections by individually or collectively analysing the problem in the context of prior knowledge to be able to make sense of the problem. They work in peers or small groups to discuss the phenomena as they think and provide answers that would serve as the solution to the given problem. Sartika, Susantini and Jatmiko (2019) identified the following syntax in PBL: (1) orienting students on the issues, (2) designing the process of solving the problem with scientific method/organizing the students to learn, (3) independent investigation/group guide, (4) developing and presenting the result of the work, and showing it off, and (5) analysing and evaluating the process of problem solving.

Context based learning is a method of instruction in which the teacher adapts a top-bottom approach by using a context in another field, for instance, physics to teach a concept in Geography. The Geography teacher can use the context of the law of gravity in physics to teach migration or transportation flow between cities. Learning through context can enhance the student's motivation to learn and develop critical thinking skills (Sudibyo, Jatmiko & Widodo, 2016). The syntax identified in this approach by Sartika et al. (2019) includes orientation, organization, examination, experimentation and communication.

Group investigation is a term used interchangeably with cooperative learning methods. Other names for group investigation are Jigsaw, learning together and constructive controversy. Group investigation (Baki, 2008) refers to a learning process involving four fundamental stages, viz: determination of instructional goals, establishment of groups, implementation of group investigation, and evaluation of group investigation. This implies that group investigation is characterized by students working in small groups on a predetermined common goal. The working plan for the investigation is prepared by the teacher and distributed to groups during the implementation of the investigation. Other roles of the teacher in group investigation are: encouraging students, observing working of groups, giving propping questions to students, supervising their work and giving feedback to them.

Concept mapping is a tool for creating learning processes and for evaluating learning outcomes. This enhances the student's analytical thinking skills, and it helps them to sequence and build knowledge structure, which in turn leads to comprehensive understanding (Areesophonpicket, 2013). The author posited that students use concepts mapping in two ways: (1) to learn a reviewed or new concept, and (2) to acquire understanding of their own learning process. The conceptual framework for the application of concept mapping could be the constructivist theory; the bloom revised higher order thinking process, particularly 'analysis'; research-based learning theory; and so on. The key features of concept mapping, as presented by

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Areesophonpichet, is that the components of new knowledge are related to each proposition by using 'linking words' or phrases to represent the meaning of each proposition and that squares or boxes are symbols that express the meaning of each proposition.

Spatial problem based learning (SPBL) is an instructional model similar to problem based learning, except that SPBL is carried out in the context of the earth's space. The model was developed in 2020 by Silviariza and Handoyo (Silviariza, Sumarmi & Hondoyo, 2020) for the purpose of making Geography education meet the 21st century needs of learners, hence to make Geography education, engender in learners' capabilities such as analytical thinking, critical thinking, creative thinking, problem solving, and communication and collaboration skills. Essentially, the authors assert that SPBL is a learning model that provides opportunities for students to be able to provide solutions to problems by studying them spatially and scientifically. Silvariza Sumarmi and Hondoyo (2020) identified five syntaxes of SPBL to include: (1) orienting spatial problems, (2) formulating spatial problems, (3) collecting, organizing spatial data and information, (4) analysing spatial data, and (5) communicating result of analysis of spatial data. These clearly show that SPBL is a combination of spatial based learning (SBL) and problem based (PBL), thus problem based learning in spatial context (PBLSC), which follows the method of scientific investigation. This is apposite for the study of geographical and environmental science and bridges the gap of weakness of PBL and SBL in addressing critical spatial problems.

Silviariza, Sumarmi and Handoyo (2020) in allusion to Suan, Burton, Koahang and Utimi, outlined the advantages of SPBL as: (1) students are trained to work in team, (2) students can identify spatial (geographical) problems through observation with a scientific process, (3) students are encouraged to think critically about spatial problem contextually and factually so that learning becomes meaningful, (4) students are trained to describe the relationship between one phenomena and another, and (5) students can make decision for a spatial problem with scientific steps. The authors further stressed that the use of SPBL is appropriate for creating the atmosphere of scientific learning, honing teamwork skills, sensitivity, critical thinking and problem solving skills.

Experiential learning is generally viewed as an instructional method in which students are involved in concrete experience of the things or subject matter of teaching and learning (Dakur, 2018). It is a teaching technique that encourages students to actively engage in the material of learning (Hackathorn, Solomon, Blankmeyer, Tennial & Garczynski, 2011). Such classroom engagement has been found to promote deep level thinking and better facilitate encoding, storage and retrieval than traditional lecture (Macglygann, 2005; Peck, Ali, Matchok & Lewin, 2006). Cognitive psychologies asserted that experiential learning strategy is capable of engaging students in higher order cognitive processes such as analysis, synthesis and evaluation (Bonwell & Elson; Hackathorn et al., 2011). In geographical context, experiential learning through field work enables learners to catch different perspectives of the environment and the space in which they live. Kolb (1984), the proponent of experiential learning, conceptualized learning as consisting of a circle of four stages: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE). In the light of Kolb's cycle of experiential learning, Dudley and Parker (2004) outlined six steps to integrate experiential learning in the classroom as follows:

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1. Set up the experience by introducing learners to the topic converging basic material learners must know before hand,
2. Engage the learners in realistic experience,
3. Allow for discussion of the experience,
4. Allow the learners opportunity to formulate concept and hypothesis concerning the experience through discussion as well as individual reflections,
5. Allow the learners to experiment with their newly informed concepts and experience,
6. Allow the learners to further reflect on their experience.

This paper proposes an approach which combines spatial problem based learning (SPBL) and experiential learning (EL) to be known as experiential spatial problem based learning (ESPBL) to be executed though the following syntaxes:

1. Orientation and grouping of learners,
2. Presentation/identification of spatial problem,
3. Explanation of spatial problems,
4. Presentation of guiding analytical questions,
5. Allowing opportunity for concrete or vicarious experience of spatial problem,
6. Allowing opportunity for discussion and reflection on spatial problem,
7. Formulation of concepts or theories on spatial problem,
8. Allowing active experimentation of knowledge learnt by attempting written answers to guiding analytical questions,
9. Presentation of result/answers by groups,
10. Conclusion by the teacher and students.

All the pedagogical models discussed above have the potential for enhancing higher order thinking skills (HOTS) of learners if carefully and conscientiously implemented by teachers. Ananda and Noferion (2019), in reference to Brookhart, stated that HOTS involves (1) analysis, evaluation and creation, (2) logical reasoning, (3) consideration and critical thinking, and (4) problem solving and creative thinking. All the syntaxes fall within cognitive levels four to six (C4, C5, C6) of the revised bloom's Taxonomy (2001) with the following operational verbs:

C4 Analyse - compare, examine, criticize, and test

C5 Evaluation – evaluate, assess, refute, decides, and choose and support

C6 Create – construct, develop.

Any education and learning program which raises objectives to this level of thinking is poised to produce the right manpower for survival in the twenty-first century of the fourth industrial revelation. This paper is a trial concluded for contributing to the achievement of this laudable objective.

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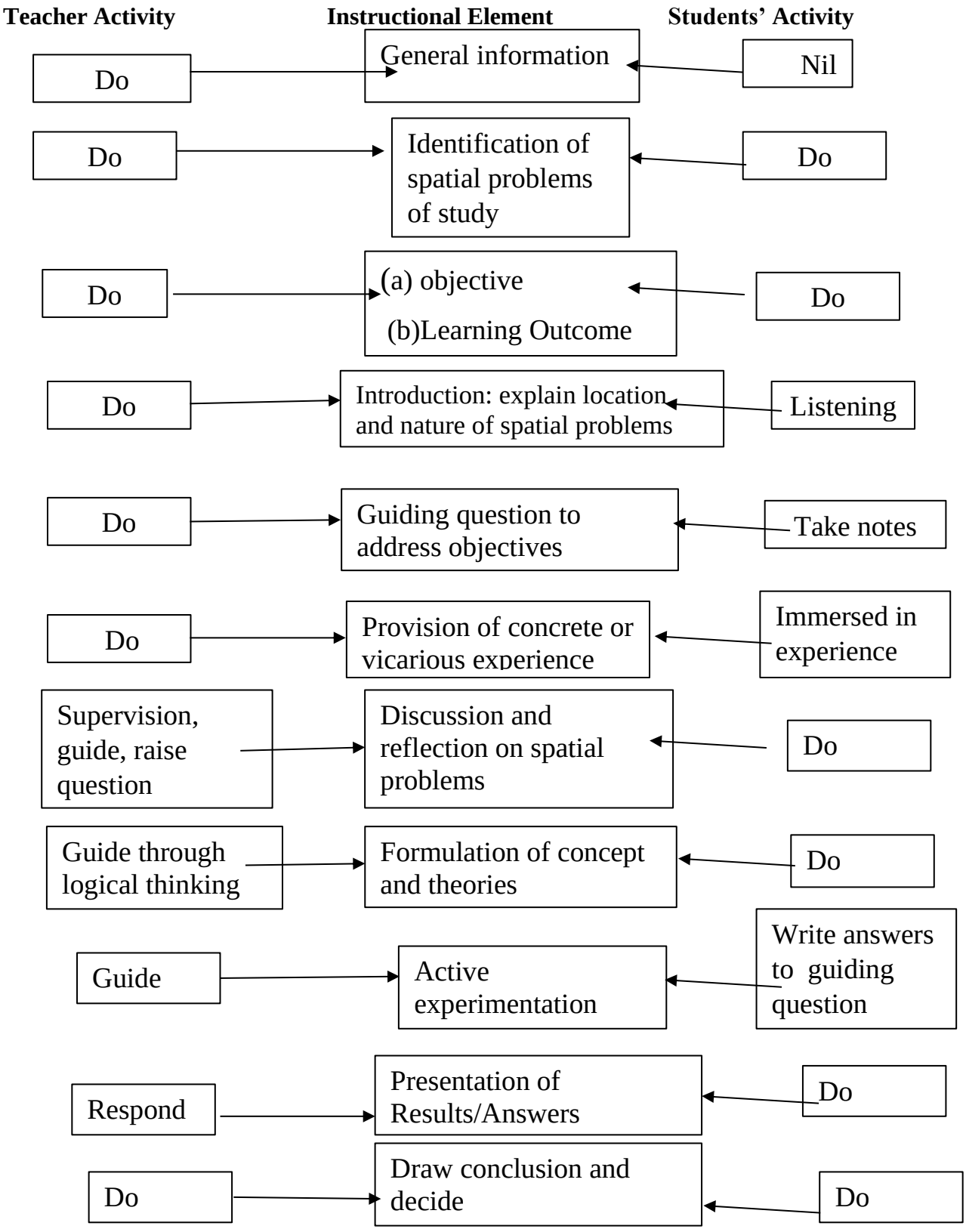
Instructional Guide for Experiential Spatial Problem Based Learning (ESPBL)



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This can be used as a guide to teach Geography to secondary school students to achieve analytical thinking skill outcome. Note that the guiding questions in Stage 5 should strictly be within the revised bloom's cognitive level 4, since the target learning outcome is analyse.

CONCLUSION AND RECOMMENDATION

The twenty-first century's purpose of education the world over in every discipline of learning hinges on the sustainable development goal which aimed at value orientation, poverty eradication, job creation, wealth generation and economic empowerment. Geography as a school subject cannot afford to be left behind in this pursuit, lest it loses its relevance in the community of learning and contribution to national development. This therefore calls for a serious reconsideration of the way we teach the subject at the level of recall and remembering of facts to new approaches that stimulate deeper understanding in the students. It is therefore recommended that the proposal made in this paper for the use of ESPBL be experimented in real classroom situations to ascertain its validity.

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