Prestige Journal of Education, Vol. 4, No. 1, June 2021 ISSN: 2645-324X (Print)
A publication of the Association for the Promotion of Innovation in Education (APIE) ISSN: 2645-3223 (Online

The Concept of Teaching for Understanding in Environmental Education

Denis U. Agiande
Department of Environmental Education
Faculty of Education
University of Calabar, Calabar
suremercies4me@gmail.com

Abstract
Research to improve teaching and learning is a continuous process and one of such researches is on teaching school subjects for conceptual understanding and higher-order thinking and problem-solving skills, and their application. Effort in this direction has produced successful experimental programmes in most school subjects such as Mathematics, Language studies, Social Studies, including Environmental Education (EE). EE as a discipline is so broad that many teachers/lecturers, for several teaching constraints, sacrifice depth of teaching in order to cover the breadth of the curriculum, thereby negating the primary objective of Environmental Educators which is to facilitate students' active participation in the teaching learning process. Students who are taught in this manner store their knowledge in 'bits' and 'pieces' and have difficulty connecting EE concepts holistically. But constructivist teaching for conceptual understanding seeks to correct this abnormally in EE teaching and learning because teaching for conceptual understanding often means covering less breadth and more depths. This article explores the concept of teaching for understanding in EE as put forward by expert EE educators; that others can apply with concrete positive results for the benefit of other EE educators that will enhance the proper teaching of the discipline at all levels.
Keywords: teaching, learning, understanding, Environmental, Education, pedagogy

Introduction
A cursory glance at the heading of this discourse may evoke some questions such as "is all teaching activities not aimed at leading learners to understanding? The answer to this question is unfortunately not the type that require a straight "yes" or "no" response. According to Tomlinson (2011), what passes for teaching in many classrooms is that teachers just get students to "cover" lots of facts, vocabulary words, names, data and rules etc, which unfortunately many learners forget much of what they learn as they leave that information behind and move on to another topic or lesson as

the case may be. Much of the memory loss occurs in the brain because they never really understood or saw the purpose of what they learned.

Olsen (1999) explicates this further using research evidence from brain research, and writes:

> From brain research, we have come to understand that the brain is a pattern-seeking device in search of meaning and that learning is the acquisition of mental programmes for using what we understand. Thus, the most usable and useful curriculum for classroom teachers would be one that made clear for teachers and students what the patterns are (the concepts to be learned) and how those understandings would be used in the real world (Expected student performance).

The notion of "Teaching for Understanding" (TFU) therefore implies helping students construct connected network of knowledge by relating new content to existing knowledge in their mental schemata; and to access the knowledge for use in appropriate application situations (Good & Brophy, 2012). Following this line of thinking, Orlich, Harder, Callahan, Trevistan and Brown (2007), express their view that the foundation of this constructivist model is the idea that learners bring with them prior knowledge and beliefs, so that learning builds on what learners have already constructed in other contexts. This constructivist philosophy which has evolved over the last half of the twentieth century, made researchers and others begin to seek a more student-centered instructional model.

However, Orlich et al. (2007) warned that constructivism must not be understood as a monolithic philosophy or methodology; it encompasses a range of beliefs and pedagogical approaches ventilated by the likes of Bandura, (1977, 1997), Gragnor and Collay (2001), Philips (2000), Shapiro (2000). Others are Power, Strike, Henson and Gretzog (1992) as cited in Agiande, Williams, Dunnamah and Tumba (2015).

This concept of teaching for understanding therefore is not a one-size-fit-all approach; it can be applied in different contexts using different nomenclature such as "concept based teaching" or differentiated instruction (Tomlinson, 2011). The North American Association for Environmental Education (NAAEE, 2006), as cited in PLT (2006), a body that regulates the teaching of Environmental Education in North America, tags it 'Teaching for Conceptual Understanding.' whatever the term used to characterize this type of teaching, teaching for understanding is a situation where students are taught in a manner and to the extent that it induces conceptual change in students' understanding. This change can be contextualized in two ways.

First, the change that takes place in the learner, according to Rainer (1999), affects the learner in several ways; such as (1) knowledge and beliefs are formed within the learning; (2) learners personally imbue experiences with meanings (3) learning activities cause learners to gain access to their experience, knowledge and beliefs and the outcomes of the learning process are varied and often unpredictable.

However, if students come to the learning situation with pre-existing beliefs, which are accurate, fresh teaching should be a process of extension of their knowledge and a natural starting point for fresh learning. Conversely, if the learner harbours misconceptions, such will need to be corrected before fresh learning begins so that the misconceptions do not persist and distort the new learning.

Tomlinson explains practically that rather than teachers slogging through a swamp of facts with students, just to cover ground, a teacher equipped with the knowledge and merits of concept based teaching will rather help students better understand and see utility in an area of study by emphasizing its key concepts and principles, because to her, concepts are the building block of learning. Using a typical illustration, she explains further that instead of spending a long period of time to memorize certain categories of animals in a lesson, learners can be guided to use same amount of time to study patterns in the animal kingdom; that is to say learn their traits, use traits to identify and classify animals and learn how to predict the traits from habitats or vice-versa. "Patterns" here become the concept that undergirds the taxonomists' classification of things. When students learn and become adept at predicting patterns, they could in turn use those patterns to think about other life forms that will ultimately help them in the following areas: (1) understand rather than memorize (2) retain ideas and facts longer because they are more meaningful (3) make connections between subjects and facets of a single subject (4) relate ideas to students' own lives and (5) build networks of meaning that facilitate effective handling of future related knowledge.

Good, McCaslin and Regs (1992) in Good and Brophy (2012) record that since developed, the concept of teaching for understanding has gained acceptance across many disciplines and school subjects in the curriculum mostly because of the growing consciousness that education must include the development of learners' meta-cognitive skills (a higher order application skills such as critical thinking skills, problem solving skills, integration elaboration etc). Some of these subjects include mathematics, language studies, social studies, reading, writing and the sciences.

Teaching for understanding practically requires well prepared and comprehensive lesson plan that include critical thinking and problem solving applications of lesson contents. This means that the breadth of content addressed must be limited in order to

allow for more in-depth teaching of the content that is included as against the long list of knowledge items and sub-skills to be broadly covered. Practically still, this translates to the fact that teachers who teach for understanding and meta-cognitive application of subject matter content do both of the following: firstly, they limit what they try to teach by focusing on what they see as most important and omitting completely or including very little of the rest; secondly, they structure what they do teach around important ideas and elaborate it considerably beyond what is in the curriculum or concise scheme derived from the broad curriculum. Thirdly, they concentrate on key ideas, relationships keywords, but elaborating on such keywords; they make connections, ask questions, correct misconceptions, show implications, practical real life applications of the concepts in question; which will be embedded in the course of the lesson delivery.

Also, the skills they intend learners to acquire are clearly included and stated, indicating how the skills to be so acquired have real life application in clear terms for the learners to comprehend. Finally, process evaluation and formative evaluations will need to be engaged to evaluate the lesson structured for teaching for understanding. Enrichment activities that must go with the lesson give students exciting opportunities to broaden, expand their learning and enrich the entire learning experience (Good & Brophy, 2012).

Teaching for conceptual understanding in environmental education

One of the founding documents of the environmental education field is the United Nations Educational, Scientific, and Cultural Organization (UNESCO), Tbilisi Declaration of 1978. The document enunciates what the discipline is, its key objectives, teaching and learning approaches and expected learning outcomes of the discipline. Environmental Education is seen as a process that increases the learner's awareness and knowledge about the environment and related issues. It helps to develop the necessary skills and expertise to address these issues, and foster attitudes, motivations, and commitments to make informed decisions and take responsible action (UNESCO, 1978).

The three objectives of the declaration are (1) to foster clear awareness of, and concern about economic, social, political and interdependence in urban and rural areas (2) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment (3) to create new patterns of behaviour of individuals, groups, and society as a whole towards the environment. Every institution, department, and every environmental educator sets on providing quality education about the environment need to align its mission to the goals and objectives of the Tbilisi declaration. It develops from a strong belief that

Environmental Education learners need the kind of active learning experiences constructivist theory advocates and supports (Guyton, Reiner, & Wright, 1997).

For purpose of clarity and as a sterling example of how to teach for understanding or better still how to teach for conceptual understanding in a typical environmental education situation as separate from the way other subjects and discipline apply this concept in their fields, this article selects two bodies that have pioneered the teaching of Environmental Education since its inception as a discipline after the Tbilisi Declaration. The bodies are (1) the North American Association for Environmental Education (NAAEE) and (2) Project Learning Tree (PLT), a brain child of the American Forest Foundation.

The North American Association for Environmental Education (NAAEE)

This is an umbrella body that regulates the activities and teaching of Environmental Education in U.S.A. It provides guidelines, supervises and reviews activities, approaches used by the various Environmental Education programmes that exist across the 50 states of America including the District of Columbia. The body has established a set of guidelines for developing and selecting high quality Environmental Education materials. The six key characteristics of such materials are: fairness and accuracy, depth, emphasis on skills building, action orientation, instructional soundness and usability.

Project Learning Tree (PLT)

Project Learning Tree (PLT) is the Environmental Education Programme of the American Forest Foundation first developed in 1976. They organize professional development workshops for environmental Educators in America and others who attend the workshop annually from all over the world. PLT is widely recognized as one of the premiere Environmental Education programmes in the world. Through hands-on interdisciplinary activities, PLT helps young people especially learn how to think, not what to think, about complex environmental issues. Developed to meet National and States standards, PLT provide the tools educators need to bring the environment into the classrooms and their students into the environment, whether teaching occurs within the natural or built environment. PLT activities reflect several methods of teaching. The activities are based largely on constructivist learning theory, whole language (subject) teaching strategies and service-learning models. Their approaches can truly be characterized as cutting-edge approaches to teaching Environmental Education. Their methods are highlighted for possible adoption for use by other Environmental educators.

The PLT approach to teaching for conceptual understanding

This approach which has been shown to be in use in other subject areas is also adopted for use in Environmental Education. But here, the PLT give detailed, practical and usable steps to teaching for conceptual understanding.

According to PLT (2006), students come into the learning process with preconceived ideas and knowledge, contrary to the paradigm that was popular among educators in the 1950s and early 60s that learners come to the classroom as tabular rasa or empty vessels waiting to be filled. PLT believes that a primary job of educators is to facilitate students' active participation in the teaching-learning process. Teaching for conceptual understanding often means covering less breadth and more depth, and one way to make "less" go farther is to use themes to connect concepts and transcend traditional subject areas. Themes help students to organize bits of previously disconnected knowledge and to easily store and recall new information.

This position of PLT is premised on the constructivist theory of learning which recognizes that students construct new understanding by combining previous knowledge with new discoveries. Learning specialists of the constructivist learning such as Bryce (2003) and Posner (1982) in Agiande et al. (2015), Good and Brophy (2012) have found that students' preconceptions about the way the world works have a profound effect on their ability to integrate new scientific explanations of natural phenomena. PLT provides activities for teachers to guide their students towards new discovery and scientific understanding and simultaneously to help develop students' critical thinking and problem solving skills, also known as meta-cognitive skills.

Here is an example provided by PLT on studying the environment using the "theme" approach that further clarifies the teaching for conceptual understanding in Environmental Education. The theme of diversity is used; students exposed to this theme may discover that a diversity of biological characteristics among organisms improves the stability of an ecosystem. By applying this same theme to studying human society, students can also find that a diversity of values and lifestyles is inherent in social systems.

ISSN: 2645-324X (Print)
ISSN: 2645-3223 (Online

SAMPLE
Conceptual Framework

Theme: Diversity
1.0 Throughout the world, there is a great diversity of habitats, organisms, societies, technologies, and cultures.
Diversity in Environments
1.1 Biodiversity results from the interaction of living and non-living environmental components such as air, water, climate, and geological features.
1.2 Forests, as well as other ecosystems, contain numerous habitats that support diverse populations of organisms.
1.3 The Earth's atmosphere water, soil, climate, and geology vary from region to region, thus creating a wide diversity of biological communities.
Diversity of Resources and Technologies
1.4 Humans use tools and alter environments to adapt and alter environments and resources to meet their physical, social, and cultural needs.
1.5 Technologies vary from simple hand tools to large-scale and complex machinery, mechanisms, and systems.
Physical Diversity
1.6 The element of physical diversity include; age, sex, physical condition, physical attributes and physical impairment and disabilities.

Source: PLT, 2006; Orlich et al, 2007

This sample was created for pre K-8 classes (the equivalent of JSS I and JSS II in Nigeria). This activity Guide curriculum materials are arranged under five themes as follows: (a) diversity (b) interrelationships (c) systems (d) structure and scale (e) patterns of change. Each theme covers the topics of Environment, Resource management and Technology, and Society and Culture. Below is a sample of the conceptual framework.

By using themes as indicated above, it helps students organize bits of previously disconnected knowledge, and to easily store and recall information. For example, by

studying environment using the theme of diversity, students may discover that beside a diversity of biological characteristics, other diversity such as diversity in environment, diversity in human culture, diversity of resources and technologies and physical diversity also exist, thereby helping the students to organise their knowledge of 'diversities' in a holistic and connected manner. This type of knowledge can be transferred and used in real life situation to solve environmental problems.

Summary and conclusion

The PLT example of teaching for understanding reflects the combination of several methods of teaching such as environmental literacy and values with each activity capable of guiding the learner through the process of awareness, understanding, challenge, motivation and action solicited by involvement of hands-on experiences.

Finally, the exemplar provided by PLT demonstrates that when teachers use the whole language or whole subject approach, students are taught holistically rather than in bits e.g. for one to teach biological diversity in one lesson, then teach cultural and human diversity and so on; these bits and pieces do not help learners build connections between the whole theme of diversity. But by focusing on 'themes' as illustrated above, conceptual understanding, critical thinking skills all go together rather than on the simple transfer of isolated bits on Diversity. Students therefore stand to benefit more by this approach that engenders whole experiential learning.

Implications for environmental educators

The implication of this article for environmental educators at all levels is that the teaching of Environmental Education must be reviewed very often by teachers as part of their reflective practice as Educators. The discipline is wide and the various approaches such as interdisciplinary approach, the infusion of Environmental Education concepts into subjects like Social studies, Economics, Biology, Chemistry leads to fragmentation of knowledge into 'bits' and 'pieces' of vital environmental information which lead students to understand Environmental Education in an unconnected manner, causing learners to be handicapped in building connections in their knowledge of environmental concepts and issues.

In teaching Environmental Education as one single core subject, educators need to strive to cover more depth in the curriculum than cover so much 'ground' with very little taught. The PLT model/approach can help teachers structure their instructions to teach to the nexus.

References

Agiande, D. U., Williams, J. J., Dunnamah, A. Y., Tumba, D. P. (2015). Conceptual Change Theory as a Teaching Strategy in Environmental Education. *European Scientific Journal*, 11(35), 395-408.

Bandura, A. (1977). *Social learning theory*. New York: General Learning.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman Publications.

Bryce, N. K. (2003). Discovering your Personality Spectrum: Understanding your Values.

Gragnor, G. W. Jr., & Collay, M. (2001). *Designing for Learning: Six elements in Constructivist classroom*. Thousand Oaks, California: Corwin Publisher.

Good, T. L. & Brophy, J. E. (2012). *Looking into Classrooms* (9th ed.). New York: Longman Publishing.

Guyton, E., Reiner, J. & Wright, T. (1997). Develoing a constructivist teacher education programme. In D. J. Mdntyre & D. M. Byrid (Eds.), *Research on the Education of our Nation's Teachers*. Thousand Oaks, CA: Corwin Press.

Olsen, K. (1999). Science Continuum of concepts for K-6 Kent WA: Centre for the future of public education.

Orlich, D. C., Harder, R. J., Callaman, R. C., Trevistan, M. S., & Brown, A. H. (2007). *Teaching strategies: A guide for effective instruction* (8th ed.). Boston: Houghton Mifflin Company.

Philips, D. C. (Ed.) (2000). *Constructivism in Education: Opinions and Second Opinions on Controversial Issues*. Chicago: University of Chicago Press.

Project Learning Tree (PLT) (2006). Erwin, C. (Ed.): *Pre-K-8 Environmental Education Activity Guide.* Washington DC: American Forest Foundation.

Rainer, J. D. (1999). Faculty living their benefits. *Journal of Teacher Education*, 5(3).

Shapiro, A. S. (2000). *Leadership for constructivist schools*. Scarecrow: Lanham, MD.

Tomlinson, C. A. (2011). *How to Differentiate Instruction in Mixed-Ability Classrooms* (2nd ed.). Alexandria, Virginia U.S.A: Association for Supervision and Curriculum Development (ASCD) Publication.

UNESCO (1978). *Tbilisi Declaration on Environmental Education*. Paris: UNESCO.