

Enhancing Critical Thinking Skills of Students' through Project-based Instruction: A Mandate for Secondary Schools in Nigeria

Ochigbo Faith Ihotu¹; Yaki, Akawo. A.²; Koroka, M. U S³.

Department of Science Education School of Science and Technology Education

Federal University of Technology Minna, Niger State

Corresponding E-mail; agifaith300@gmail.com/ +234 706 484 6284

Abstract

The quest to help learners acquire critical thinking skills because it is one of the sought-after skills by employers in the 21st-century is in the forefront of academic discourse. Therefore, this paper examined enhancing critical thinking skills in students: a mandate for secondary schools in Nigeria. This paper sought to examine ways by which secondary education in our country (Nigeria) can be restructured in a manner that critical thinking skill could be inculcated in the young learners, to make them problems solvers, hence they become asset in the society rather than liabilities to the Nigerian society. This paper in clear terms examined the concept of critical thinking, the importance of critical thinking to the nation, Project-Based Instruction as a methods of inculcating critical thinking skills in students specifically in secondary educational level. It was concluded that critical thinking skills are critical for personal success, national peace, progress and development, it should be integrated at all level of education especially at the secondary level of education for the common good of all. It was recommended among others that teachers should adopt innovative and suitable methods of teaching such as project-based instruction that are consistent with the development of critical thinking skills in students.

Keywords; Critical thinking skills, Project-based Instruction, and Secondary education

Introduction

The world is bedeviled with social, environmental, health and educational problems. The daily interaction of man with both his physical and social environments created these problems. These problems continue to get more and more complex on a daily basis. In any society, human life is a series of confrontations (Adeyemi 2012). Confrontation with oneself, with other people, with societal institutions and with one's environment leaves man with countless problems to battle with in the society. The person who deal with these problems and issues successfully is one imbued with the right type of knowledge, skills and competencies required to solve these problems.

Education certainly has a responsibility and function to equip learners with techniques of dealing with the problems and evolving issues, in order to make them live a happy and fulfilled life in the society. Hence, the reason why the most challenging role of education generally today, is to equip the students with the ability and capability to deal successfully with the fast changing world and the unknown future. Certainly, the presents situations and problems may become obsolete when students of today face the world as adults tomorrow. One of the tools which education can perfectly provide for these youngsters is critical thinking which provides them with the needed skills to solve problems and issues in life regardless of their nature. More than ever before in Nigeria today, there is the need for commitment to the resolution of ensuing societal problems through appropriate education. The individuals who seek to resolve issues and problems without the appropriate skills, abilities and proper understanding of the problems, often tend not only to behave

irresponsibly and erratically, but also in ways that damage their own future and the human condition in the society.

Education is a pivotal factor or the most potent weapon when it comes to the development a nation. It has been described as an instrument "par excellence" in the national policy on education for affecting national development (FRN 2004). Experts in the field of education has define education in various ways. But for this paper, a simple and functional definition of the term will be used as it one of the keywords in this paper. Jekayinfa and Kolawole (2008) define education as "the process of development of an independent and integrated personality, which entails the training and acquisition of special knowledge, skills, attitudes and values needed by an individual to be responsible and which would enable him to contribute his own quota to the growth of the society of which he is a member". After subjecting this definition to series of analysis it was seen that the definition agreed with the Nigeria philosophy of education which are as follows;

10. Development of individual in to sound and effective citizen.
11. Provision of equal asses to educational opportunities to all citizens of the country at all levels both inside and outside the school system.
12. Full integration of individual in to the community.

Nevertheless, the goals which the Nigerian nation set to achieve through the provision of sound education to her citizens include:

2. Inculcation of national consciousness and national unity.
3. Inculcation of the right type of values and attitudes for the survival of the individual and the Nigerian Society.
4. Training of the mind in the understanding of the world.
5. Acquisition of appropriate skills and the development of mental, physical and social abilities and competencies as instrument for the individual to live in and contribute to the development of the society.

From the goals stated above the needs and ambitions of the nation have been captured appropriately by these goals. This mean that any form of education provided in the country must be aware of the need of the people for that education to be seen as viable. In view of item 4 (Acquisition of appropriate skills and the development of mental, physical and social abilities and competencies as instrument for the individual to live in and contribute to the development of the society). The appropriates skills includes the 21st century skills which are; critical thinking skill, creative skills, collaborative skills, communicative skills and problem solving skills. These 21st century skills do not only provide a frame work for successful learning in the classroom, but ensure students can thrive in a world where change is constant. And they are also tremendously important for our nation's well-being. Our business community demands a workforce with those skills to ensure our competitiveness in a global economy.

Education is a life-long process, which aims at imparting skills and knowledge needed to lead a purposeful life and equip the learners so as to be able to adjust to the remote and immediate environment in which he finds himself. Thus, in order for education to be seen as carrying out its expected roles in the society, it must provide the learner with the relevant body of knowledge, skills, attitudes and values that would make him an effective and active member of his society.

One of such skills the learner is expected to be imparted with is critical thinking, which is the focus of this paper. Paul and Elder (2016) states that when learners are imbued with critical thinking, they are able to gain knowledge, understanding, insight, and solve his personal problems, problems in his family as well as solving societal problems in whatever sphere of life such problems may manifest. This way, the learner becomes a problem solver rather than a liability. And these are the kind of individuals the society needs today, which is in accordance with the goals of education stated above.

Critical Thinking

Living in the 21st century requires higher thinking skills such as critical thinking (Riechman & Simon 2013). Thinking is an activity in which an individual search for a proper answer, filtering out various kinds of data or information, solve problems, and make decision Colley *et al.*, (2012). Critical thinking features prominently in all the skills or abilities learners are expected to acquire through the education being provided. One, who cannot think, may not be able to solve even the smallest problem. We now live in a world of problems which include educational problem, social problem, political problem, economic problem, religious problem, ethnic problem, Science and technologically related problems to mention a few. It only takes a sound mind, a mind imbued with reflective thinking, which can engage in deep analysis, to come up with causes of the problem at hand and generate possible solutions or options to arrive at a decision to solve the problem.

Given the complex nature of critical thinking, researchers use diverse concepts to define critical thinking. According to Lunenburg, (2011) Critical thinking is a process that occurs because of an understanding of the various information that is integrated through learning skills. Because critical thinking occurs through learning, it requires a thinking process that requires the ability of analysis, synthesis, and evaluation. In other words, critical thinking is the purposeful and reflective judgment about what to believe or what to do in response to observation, experience, verbal or written expressions or arguments. Hence, critical thinking involves determining the meaning and significance of what is observed or expressed, or concerning a given inference or argument, determining whether there is adequate justification to accept the conclusion as true.

This definition is in consonance with the one given by Fisher and Scriven (2011) as skilled and active interpretation and evaluation of observations, communications, information and argumentation. Critical thinking therefore gives due consideration to the evidence, the context of judgment, the relevant criteria for making the judgment, the applicable methods or techniques for forming the judgments and the applicable theoretical construct for understanding the problem and the question at hand. Critical thinking employs not only logic but broad intellectual criteria such as clarity, credibility, accuracy, precision, relevance, depth, breath, fairness and significance.

Similarly, Bromley (2011), said that critical thinking is the ability and tendency to analyze complex issues and situations, recognize and evaluate assumptions and alternative points of view according to acceptable criteria, make conclusions, draw reasonable conclusions based on accurate information, make interdisciplinary connections, and transfer insights to new contexts. Critical thinking is define as a cognitive skill that determines how well a person collects, processes, and uses information to identify the best way to achieve goals or navigate complex situations. Given the above definition, it can be concluded that critical thinking is a systematic, complex intellectual process, involving various attitudes and skills, accompanied by a process of analyzing and

evaluating within the framework of making improvements. Critical thinking as an intellectual process involves the activities of attitudes, knowledge, and skills. The main activities in critical thinking are analysis, evaluation, and argumentation (Butterworth & Thwaites, 2013).

Consequent upon the foregoing, it may be summarized therefore that, critical thinking is self-guided, self-disciplined, self-directed, self-monitored and self-corrective thinking, which attempts to reason at the highest level of quality in a fair-minded way. Thus, people who think critically consistently, attempt to live rationally, reasonably and empathically. They are keenly aware of the inherent flawed nature of human thinking when left unguided. People who can think critically strive to improve the world in a more rational and civilized way they can contribute.

Importance of Critical Thinking to the Nation

Critical thinking is crucial for economy development, promotes creativity, it's a key for career success, helps in better decision making, developing better citizens, and enhances problem solving skills among students. There are various classroom activities that can enhance critical thinking in students these includes; Debates/arguments, student-led discussion, questioning techniques, research an brainstorm, explore specific issues or problems, developing a solution and presenting it in the class e.tc. Given the foregoing, the importance of critical thinking to the individuals in particular and the nation at large is unquestionable. However, thinking is often casual and informal. Most of our thinking if left to itself is partial, distorted, biased, uninformed or down-right prejudiced. Yet the quality of our lives and that of what we produce, make or build depends precisely on the quality of our thought. Mediocre thinking is costly, both in money and in quality of life. This fact buttress the importance of critical thinking in the life of a nation and that of the individual. This is because critical thinking enables one to analyze, evaluate, explain and restructure his thinking, thereby reducing the risk of adopting, acting on, or thinking with a false belief. However, even with knowledge of the method of logical inquiry and reasoning, mistakes can happen due to a thinker's inability to apply the methods or because of character traits such as egocentricism. Critical thinking includes identification of propaganda, prejudice, distortion, bias, misinformation self-deception, and so on. We live in a world of problems, and it is imperative for the individual, particularly students in the country to be equipped with the skills, abilities and capabilities to get their problems and those of the society solved, thereby, making the nation a worthwhile place to live in. However, Delgado et al (2011) described Twenty-first century skills as critical thinking skills that are the most sought-after skills by employers of labour to improve and increase their output. This underscores the importance of education that is relevant to the needs of the 21st century to produce critical thinkers and problem solvers. Consequently, critical thinking is a mandate for our schools in Nigeria because it help student's deal with everyday problems as they come their way.

Developing Critical Thinking Skill in the Students

One pertinent question that comes to mind at this point is how to enhance critical thinking skills in students. It is interesting to note that critical thinking ability can be inculcated in the learner at any point of the educational hierarchy starting from primary school level to tertiary level. What differs is the level of engagement at each level. Thus, while it is important to start developing critical thinking in the learner right from the primary school, it is better effected in students at the secondary level. This is because students at this level are more mentally matured to cope with the challenges involved.

However, the question on how to develop the critical thinking ability in students still remains. This is a methodological issue. What method do we adopt in order to effectively develop critical

thinking in the students? As it has been observed, critical thinking is about being both willing and able to evaluate one's thinking, and could be effected through the teaching and learning of any subject in the school curriculum. Developing critical thinking skills in students, involves learning how to evaluate, make judgment, analyses, and interpret statement. To do this successfully, one should adopt a perspective rather than judgmental orientation that is, avoiding moving from perception to judgment as one applies critical thinking to issues.

Critical thinking is based on concepts and principles, not on hard and fast rules. These concepts are exemplified in: identification of problem, rational inquiry, conceptual analysis, logical reasoning, nature of argument, identification of premises, and conclusion; while principles involved in critical thinking include: acquisition of knowledge through thinking, reasoning and questioning based on facts, learning what to think through how to think; judgment of effectiveness of argument through reflective thinking, critical thinking as a search for meaning and critical thinking as a skill that can be learned among others. It employs not only logic (formal/informal), but broad intellectual criteria of clarity, credibility, accuracy, precision, relevance, depth, breadth and significance. Critical thinking is highly significant to learning. There are two phases to the learning of content. The first occurs when learners construct in their minds the basic ideas, principles and theories that are inherent in the content, for the first time. This is a process of internalization. The second phase occurs when learners effectively use those ideas, principles and theories as they become relevant in the learners' lives which is known as the process of application.

Good teachers cultivate critical thinking, that is, intellectually engaged thinking, at every stage of learning. The teacher questions the students often in an elenctic manner. The point here is that, the teacher who fosters critical thinking fosters reflectiveness in students, by asking questions that stimulate thinking which is essential to the construction of knowledge. Each discipline adapts the use of critical thinking concepts and principles. The core concepts are embedded in the content of each subject. For students to learn content, intellectual engagement is crucial. All students must do their own thinking and construction of knowledge. Good teachers are aware of this, and therefore focus all teaching and learning activities in the class to stimulate the mind to master key concepts, principles and generalizations underlying the subject.

The ability to think critically does not take place in a vacuum. Therefore, to enhance learners' critical thinking skills, the classroom instruction should be characterized by;

open-ended problem,

Questioning and question prompt,

Real-world scenario,

Collaboration/cooperation learning,

Hands-on and Minds-on activities

The instructional approaches that are learner-centred that could be adopted to help learners acquire critical thinking includes;

Project based learning

Integrated STEM Approach,

Collaborative instruction

Design-based learning/ Engineering Designed-based learning

Inquiry-based instruction, among others.

Critical Thinking for Secondary Education in Nigeria

It has been substantially demonstrated in this paper that critical thinking as an intellectual engagement belongs to the higher order level of cognitive abilities which involves analysis, synthesis, interpretation, inference and evaluation. A fact that makes it almost an exclusive function of secondary education in some countries.

This explains why in United Kingdom school system, critical thinking is offered as a subject at the Advanced level. It has also been reported about the effectiveness in fostering critical thinking in California, USA. According to the study carried out by Thomas and Nelson (2010), critical reports by authorities on higher education, political leaders and businessmen, claimed that higher education is failing to respond to the needs of the students and that many of the graduates' knowledge and skills do not meet society's requirements for well-educated citizens. The study concluded that:

1. Faculty aspires to develop students' thinking skills, while in practice teachers aim at facts and concepts in the discipline at the lowest cognitive level, rather than development of intellectual or values.
2. Faculty agrees that the development of students' higher order intellectual/cognitive abilities is the most important educational task of colleges and universities. These abilities underpin the students' perceptions of the world and the consequent decisions they make.
3. Specifically, critical thinking the capacity to evaluate skillfully and fairly the quality of evidence and detect error, hypocrisy, dissembling and bias is central to both personal success and national needs.

As it were, while this report essentially raises questions about the standard or level of performance of higher education with regards to the inculcation of critical thinking ability in students, it is clear that it is the responsibility of higher education to provide that needed skill. Nigeria's higher education sub-sector, is not an exception. Similarly, Abrami, *et al* (2008) carried out a meta-analysis study of 117 different studies of pedagogical intervention in the area of critical thinking involving a total of 20,698 participants in Canada. One of the questions addressed in the analysis was, what types of pedagogical intervention were most effective in supporting students to develop critical thinking skills? The study identified four approaches to the teaching of critical thinking namely:

1. General approach- Critical thinking being taught separately from subject area content.
 2. Infusion approach- Critical thinking is infused into subject area content.
 1. Immersion approach- Instructions in the subject is thought provoking, but critical thinking principles are not made explicit.
 2. Mixed approach- A combination of a general approach and either infusion or immersion.
- Findings of this study showed that: The immersion method was the least effective. The mixed approach was the most effective, closely followed by the infusion approach. Students' learning outcomes were significantly improved where teachers received professional development related to the teaching of critical thinking skills. Students' collaborative work resulted in small but statistically significant advantage in critical thinking.

While this author aligns with the findings above, the study however failed to make categorical statement on classroom strategies that may help develop critical thinking skills in students. This is where the concepts and principles of critical thinking highlighted earlier are highly relevant and

useful. At the classroom level, students are made to identify the problem to address, which may come from any sphere of our lives. This step is closely followed by rational inquiry into the problem and subsequent generation of possible alternative means of solving the problem. A step that actually calls for conceptual analysis of issues involved and logical reasoning, supported by sound arguments to enable students get to the fact of the case, thereby leading to the premises on which sound conclusion(s) are made. In the process, students acquire more knowledge through thinking, reasoning, and questioning based on facts and learning “what to think” through “how to think” and assessing the effectiveness of arguments through reflective thinking. This way, students could have acquired the necessary skills in critical thinking to enable them solve personal problems, those of the community and the nation at large.

Project-based Learning

Project based learning has been defined by so many scholars in many ways and there is no consensus in the definition of PjBL. PjBL has been referred to as a “model”, “approach” or a “technique”, or as “learning” or “teaching”. Project based learning according to Schwalm and Tylek (2012) Project based learning (PjBL) is a model of instruction that exposes students’with real life, multidisciplinary problems that require critical thinking, hands on activities and collaboration (Jamali et al, 2017) Buck institute define PjBL as a systematic pedagogy that engages students’ in learning knowledge and skills through an extended inquiry process structured around complex, authentic question and carefully designed product and task. Dalimonte, (2013) define project-based learning as a studentcentered approach that engages students’ as they use the inquiry process as they are given a realworld situation or problem to solve while also being aligned to content standards. Infact as long as there is a tendency that the teachers do not have time to develop a learning device that is capable of integrating the issues in real life by planting a character that can improve critical thinking skills of student in defining the problem, taking action to get findings, taking decisions and evaluating issues in real life is also a sensitive issue and it contains a moral dilemma, which is supposed to be a valuable learning resource for the character development of students’ in school (Duran & Sendag, 2012). Sahin and Top (2015) pointed out the goal of PjBL is make students’ become aware of the connections between the academic knowledge and its applications in real life while gaining a deeper understanding of concepts. The genesis of a PjBL is inquiry, in a project-based learning environment, the focus in the classroom shifts from teacher led instruction to student-led instructions. The students’ become the navigators directing their learning through the inquiry process and the development of project- based learning experiences. The teacher becomes more of a facilitator as the focus in the classroom moves from the instructors teaching the content to students’ learning the content through the inquiry process and problem solving (Dalimonte, 2013). The instructor provides the students’ with a list of guidelines, a timeline, and helps them create a plan of action for the project (Coyne et al., 2016). The students’ will decide how they will solve the project-based learning project through the use of the inquiry process. Due to the nature of project-based learning, the students’ may arrive at a solution which is not an area of expertise for the instructor (Smith and Cook, 2012). These situations create discussion opportunities and the possibility of a new and exciting solution to the problem (Smith & Cook, 2012). Thus, creating a learning environment that is conducive and exciting for learners. The main focus of PjBL is an emphasis on students’ having autonomy to make decisions about the direction of their project (Boss & Larmer 2018). PjBL begins with a student- driving question and uses an integrated curriculum approach to investigate the question, or problem. In this way the

teacher facilitates the process but the learner is in the 'driver's seat' and is guided through each step of the process by the teacher (Bell, 2010).

Conclusion and Recommendations

From the discourse above, it can be concluded that since critical thinking is a precursor to personal success, national peace, progress and development, it should be addressed with all the seriousness it requires by all stake holders for the common good of all. To this end, it is hereby recommended that:

1. Critical thinking is introduced as a separate subject or course in our tertiary institutions.
2. Teachers should be encouraged to operate more in classroom, at higher level of cognition than the lower level.
3. Teachers should adopt suitable methods of teaching such as Elentic methods, Inquiry method, project-based learning and problem solving method etc. that are consistent with the development of critical thinking skill in students.
4. Both teachers and students should imbibe the attitude of intellectual empathy and intellectual humility, culminating in broad mindedness needed for the development of the skill.
5. It is not just enough to acquire the knowledge and the skills involved in critical thinking, learners should be encouraged to apply such skills in their daily lives.

In summary, Edward M Glaser proposed that the ability to think critically involves three element namely;

10. An attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experiences;
11. Knowledge of the methods of logical inquiry and reasoning; and
12. Some skills in applying those methods

Critical thinking calls for a persistent effort to examine any belief or any form of knowledge in the light of the evidence that support it and the further conclusions to which it tends.

References

- Abrami, P., Bernard, R., Borokhovski, E., Wade, A., Surkes, M., Tamim, R., & Zhang, D. (2008). Intervention affecting critical thinking skills and dispositions: A Stage 1 Meta-Analysis. *Review of Educational Research* 78 (4), 1102-1134.
- Akinlaye, F.A., Mansaray, A. & Ajiboye, J.O. (1996). *Fundamental of Social Studies Teaching*. Lagos: Pumark Nigeria Limited.
- Bromely, P., Meyer, J. W, & Ramirez, F. O (2011) Students Centeredness in Social Science Textbooks. 1907-2008: *A Cross National Study*. *Social Forces*, 90(2) 547-570.
- Butterworth, J. & Thwaites, G. (2013) *Thinking Skills: Critical Thinking and Problem Solving*. Cambrige University Press.

- Colley, B. M, Bilics, A. R., & Lerch C. M. (2012) Reflection: A Key Component to Thinking Critically. *The Canadian Journal For The Scholarship Of Teaching And Learning* 3 (1) 167-180.
- Fisher, A. & Scriven, M. (1997). *Critical thinking: Its Definition and Assessment*. UK: Center for research in critical thinking. Edge press.
- FRN. (2004). *National Policy on Education*. Lagos: NERDC Press.
- Foundation for Critical Thinking. (2009). Critical Thinking. Org.
- Glasser, E.M. (1941). *An experiment in the development of Critical Thinking*. Columbia: Teacher's College. Columbia University.
- Jekayinfa, A.A. and Kolawole, D.O. (2008). Conceptual background to the history of education in Nigeria, In Abiri, J.O and Jekayinfa, A.A (eds). *Perspectives on the history of Education in Nigeria*.
- Lunenbutg, R. C. (2011) Critical Thinking and Constructivism Techniques for Improving Students Achievement. *In National Forum of Teacher Education Journal*. 21(3) 1-9
- Otite, O. and Ogionwo, W. (2006). An introduction to sociological Studies. Ibadan: Heinemann Educational Books (Nigeria) Plc.
- Paul. R. and Elder, L. (2008). The miniature guide to Critical Thinking concepts and tools: Foundation for Critical Thinking Press.
- Paul. R. and Elder, L (2014) Critical Thinking Intellectual Standards Essential to Reasoning well within every Domain of Human Thought, part 4. *Journal of developmental education*, 37(3) 34
- Riechman, B. & Simon, E. (2013) Between Pedagogy and Technology: A Two College Case Study *Training Israel's Teachers to Meet and Challenges of The 21st Century*. Digital Information and Wireless Communications. 215.
- Thomas, F. and Nelson Laird (2010). About the California critical thinking disposition inventory. Indiana University, Centre for post secondary research