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Re-thinking Curriculum Design and Development for Optimizing Change in Education

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Abstract: ***A developing world like Africa inherited an educational system that laid high emphasis on what is known as the 3Rs (reading, writing, and arithmetic). This teaching/learning method was perhaps relevant then, due to the enlightenment gap that existed between learners and their instructors (Missionaries/Colonial masters). The 3Rs known as rote learning regurgitation of facts is teacher-centered that subjects learners to memorization of information for the expansion of knowledge. This learning principle mostly evaluate learners through the use of tests and examinations to ascertain their learning levels. However, as good as the 3Rs learning method is, it only prepares learners for job acquisition, not problem-solving. This paper will argue for a paradigm shift, to key in with the developed world like America and start wrestling with an educational curriculum that is learners focused; a curriculum that is concerned with the 'how' to think in learning than the 'what to think.' Urbanization, globalization, complex factories/technologies in this dispensation are calling for learning principles that can guide learners on how to move from learning assumptions to the application of daily realities of life using both the cognitive, affective and the psychomotor domains. The paper attempt to define the 'how' approach using. the perspective of applying critical thinking skills before drawing a conclusion.***

Keywords: Curriculum design, the 3Rs and the 4Cs, critical thinking, instructors and learners, reflective teaching.

I. INTRODUCTION

The usual 3Rs in education (reading, writing, and arithmetic) has been the common curriculum learning approach introduced to Africans by the missionaries and the colonial masters, (Fafunwa, 2009) and (Moss and Cheu-jey 2010). Most African instructors are products of this learning method and are still using the approach on their learners. The teacher who is the main focus in the 3Rs approach, places emphasis on rote learning that subjects learners to memorization and regurgitation of information for the expansion of knowledge (Alismail and McGuire 2015). As good as this learning principle is, it mainly evaluates learners through the use of tests and examination to ascertain their learning levels. Ajayi (2006) refers to this learning approach to what most African countries adopted from the early missionaries. Considering the language and cultural barrier then, the approach suited the context, because the primary aim of Education then was for reading and writing in order to read their Bibles. The rote learning approach is said to mostly prepare learners for job acquisition rather than problem-solving. While most of the developed world have moved from the principles of 3Rs (rote learning) to critical thinking skills, many African countries including Nigeria are still yet to.

The re-thinking curriculum design and development using the 4Cs (communication, collaboration, creation, and critical thinking) principle is necessary for Africa because it is the educational system that is concerned about 'how' to think in learning rather than the usual 'what' to think approach (Marques 2012). The learner who comes from the context of 'how' to think in learning, is guided on how to move from assumptions to the application of daily issues of life (Geddes 1992).

In her attempt to renew her nine-year Basic Education Curriculum by the Nigeria Educational Research and Development Council (NERDC) some of the goals that the new curriculum is designed to meet are: "Value re-orientation; Poverty eradication; Job creation; Wealth generation and using Education to empower the citizenry" (Yusuf 2018, 4). In the nine years of education (six years of primary and three years of Junior Secondary education) the skills that the learner should have acquired are "The basic rudiments for creative thinking as well as high moral and ethical values with full positive disposition towards peace, justice equity, anti-corruption tendencies etcetera." (2018, 5). As good as these goals appeared excellent on paper, the reality is not on ground.

To adequately re-think curriculum design and development, for African education, the use of empirical study is employed to help know the right tools to apply in teaching critical thinking for an Africa learner that could acquire lifelong skills, think creatively, demonstrate ethical values and yearning for entrepreneurship (Yusuf 2018). There are highlights of a few concepts that are key in the application of critical thinking skills, as well as the right tools to use when it comes to its measurement. The paper goes further to reflect on different experimental designs for critical thinking skills and discusses reflective teaching approach as part of critical thinking skills before the conclusion.

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A. *Critical Thinking*

Different academic learning settings in the developed world have what they defined as critical thinking. Science and education (Tiruneh, Verburgh, and Elen 2014), define the term from the perspective of identifying main argumentative issues and assumptions that point out important relationships from information gotten by different authorities. This learning setting views critical thinking skills as stepping stones that help learners to identify multiple challenges in people in order to function effectively. Learners in this context use critical thinking skills with opened minds in an attempt to analyze issues logically with self-confidence as they appear inquisitive to learn. Critical thinking from a general educational point of view understands the skills as; learners' effort in moving from assumptions to applying real issues to academic writings. This perspective views the world as a transitional arena that calls for analyzing, synthesizing, and utilizing information in place of just cramming facts.

Marques (2012) from the leadership perspective views critical thinking as a discipline of rising beyond standardized thinking patterns to a creative breakthrough toward directions and activities that fulfill personal and societal needs. The principles of critical thinking include the quality of thinking that evaluates information sources, challenge assumptions, understand the context and analyze arguments from the use of metacognition (a process of planning, assessing, and monitoring one's thinking), (Kuchemann 2007).

Bellfield and Gessner (2010) of the nursing education mindset, view critical thinking as involving problem-solving, suggestion, evaluative and purposeful reflection. The discipline involves constant inquiry, reconsideration, thought processes and tendency of being lifelong learners. This act of thinking is not linear considering the complex nature of humans. It is a problem-solving discipline and decision making, sound reasoning that is creative using judgments.

Social constructivist educational theories understand critical thinking as "increasingly competent participation in the discourse, norms, and practice associated with particular communities of practice. The participation metaphor is often used to characterize the conception of learning" (Geert and Volman 2020, 371).

Each of the above definitions is coined to suit a particular learning context. Africa academicians need to realize that the usual 3Rs teaching and learning methods have not helped the continent to critically separate the role of education and that of the missionaries, address why the recipients of western education end up becoming misfits in their local rural settings choosing to look for blue and white collar jobs in the cities. Most Africa early elites did not remember to re-think a curriculum that could integrate the plural traditions of her settings which has metamorphosed to mistrust, hatred, and suspicion resulting in religious intolerance. Considering the diversity in Africa like Nigeria, the educational policy which would have emphasized a curriculum that could best suit each geo-political zone was assumed that only uniformity of such would work best when the system is not addressing Nigerian issues. Western, Quranic and Traditional education were left parallel resulting in the survival of the fittest than the unified growth of the nation (Imam 2012). It is with these gaps in mind that empirical studies in critical thinking skills are taken into consideration for a re-think curriculum of education that could help Africa.

B. *Empirical Studies on Critical Thinking*

Critical thinking, which is one of the 4Cs is a new learning method that Africa schools can adopt for relevance. Though it is revealed through studies that not many students develop these skills during training (Behar-Horenstein, Linda, 2011). The principle is very relevant; hence today's learners possessed reading ability younger due to urbanization compared to the past rural ways of living. The 3Rs might be applicable at a Crèche level where learners make an effort to form words. It is from the benefit of critical thinking learning methods that Volman observes ". . . it is not an aim of education but the aim" (Geert and Volman 2020, 365). In other words, today's learners have no option but to key into critical thinking skills for effective output in the continent.

It is proven that instructors using critical thinking skills cannot strictly use statistical (quantitative) methods alone to measure the output of their learners. It must include the use of qualitative test measures as well. Learners irrespective of levels walked into learning environments with internal threats that can either enhance or deny their ability to think critically. Factors in an African child (Nigeria) could be lack of eating well, home care, lack of good learning facilities, frequent insurgencies, and student/teacher relationships etcetera. The above-mentioned challenges and other unforeseen ones militate against critical thinking in almost all learning settings (Behar-Horenstein and Linda, 2011).

Critical thinking skills generally require the application of assumptions of what the learner thinks he/she knows and is capable of doing rather than what the teacher feels the learners should know. The skills motivate learners to correct themselves, monitor, and judge the way they reasoned, think and reflect on issues. (Behar-Horenstein and Linda, 2011, 25) consider this stage; ''a formal operational stage' in learning.

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C. Teaching Critical Thinking Skills in Schools

Instructional stages in teaching critical thinking seem to lack 'how to' approaches. The learning objectives' guidelines are mostly general. The stages of learning are mostly a higher-order process of handling a subject during lesson planning and evaluating the learners' actions to what is taught. In these learning methods, knowledge is associated with relating old materials with new ones and putting to use the new. The learning experiences acquires during training prepares him/her for multiple tasks ahead in a day to day encounters.

Some argue the feasibility of teaching critical thinking skills in a context that believed in 'formative approach' to learning. This is because critical thinking principles believe in learning tasks that do not zero around demanding straight jacket truth. Learners can still key into the discipline to gradually differentiate between the use of the familiar teaching approach that is mostly based on scoring tests and examination which hardly develop learners toward critical thinking. In critical thinking skills, a learner is guided toward defending his/her thinking position using evidence. This learning principle suit the African learner in preparing him/her to view complex issues of their continent from diverse perspectives.

In developing critical thinking skills on learners, Behar-Horenstein and Linda argue the need for instructors to, first of all understand what constitutes the discipline in learning. The understanding is what helps them to come up with appropriate instructional activities for learners. Understanding what constitutes critical thinking includes asking appropriate questions, clarifying or challenging beliefs, judging the credibility of sources, as well as solving problems by predicting logical outcomes. Learners could demonstrate critical thinking when being able to: Take or change their position through the use of evidence, remain relevant to the point, seek accurate information, being open-minded, take into account the entire situation under consideration, have original problem in mind, search for reasons, approach a complex problem orderly, seek clear statement of the issues at hand, look for options, have other people's feelings in mind and use credible sources without being prompted (Behar-Horenstein and Linda, 2011, 28).

To apply the above instructional strategies, models such as Cornell Critical Thinking Skills Test (CCTT), Watson Glaser Critical Thinking Appraisal (WGCTA) and California Critical Thinking Skills Test (CCTST) were used in the findings to attest that more years of education have high scores on test for critical thinking (2011, 28). These tests are within factors of the formal curriculum and not outside. This implies that outside factors could come to play when years of training are later used with the application of high learning domains gotten from the many years of the educational skills acquired. The development of critical thinking learners could happen due to maturation in years of learning or the curriculum. Since there are alternatives to this instructional approach, one feels that the use of the curriculum would go a long way to develop African (Nigerian) learners to be critical thinkers right from their enrolment in the primary school stage without necessarily waiting till their 'A' levels or graduation.

In teaching the skills, Behar-Horenstein and Linda, (2011) point out the need for an approach with a subject in mind rather than a general method to teaching critical thinking. The specific approach in teaching critical thinking to them is putting in place criteria for measuring performances and instructional methods appropriate for the learners, knowing the level of the learners, duration of the learning task, how the resources of the learning are organized, and the role of the instructor in facilitating the learning.

Basing learning on the needs of the learners guides them towards engaging learning in higher-order thinking. Experts view critical thinking in two major dimensions. The first dimension attests that critical thinking instruction is only useful when it is integrated in teaching specific subjects and skills. The second dimension believes that it is only effective if it is taught separately while the principles lead the learner to the desired result of critical thinking. Karabulut (2012) suggests three ways in enhancing teaching principles. First is the use of open-ended questions to stimulate interaction with the learners. Second is the use of notes jotting in learning by learners themselves. The third is the discussion approach in learning; the approach that focuses on the learners' ability and minimizes lectures.

Behar-Horenstein and Linda suggest the use of a mixed approach standardized tests in establishing critical thinking reliability and validity to detect patterns. The standardized tests are: The Cornell Critical Thinking Skills Test (CCTT), Watson Glaser Critical Thinking Appraisal (WGCTA), and the California Critical Thinking Skills Test (CCTST). The obstacle in the use of these tests was the inability to conclude the use of the comparison. The authors further observed that critical thinking could be approached using self-appraisal by learners. In this approach, the instructor asks the learners to write about how they apply their critical thinking skills and the outcomes, content knowledge acquisition test and discipline-specific scales. To Behar-Horenstein and Linda, the use of both quantitative and qualitative research findings is what helps in getting what a researcher needs on critical thinking.

Another approach by Geert and Volman (2020) is the need for instructors to cultivate independence spirit in learners' ways of thinking. This approach is done through putting in place guidelines that limit discussing ideas found in textbooks to using their ideas to brainstorm and argue among themselves about problems and solutions in their areas of focus. Geert and Volman further suggest the need for asking learners their views on issues related to the concepts, and ideas as well as creating ways of assigning tasks that

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call for developing learners' categories and modes of classification. They discouraged the approaches that provide solutions for learners in teaching such as coming up with prepared handouts or elaborate notes on the board, etcetera. Learners learn best when their thinking involves the exchange of views with their colleagues. A teacher (Chapman, 2018) used this approach in her class quizzes by giving time for learners to write a quiz and peer themselves in twos or threes to discuss their findings. In this process, the learner was free to consult his or her notes to recall the concepts when necessary. The reason she gave was; a quiz is to help learners recall the issues and not to assess their levels of abilities. Learning that involves an exchange of views starts from the learning objectives. The learning objectives must create space for learners to open-up to themselves without the instructor dominating the learning atmosphere through the use of lectures.

Geert and Volman believe that critical thinking skills should be taught using a specific subject in mind. This intention helps learners to transfer the principles to other learning domains. Learners cannot progress in developing critical thinking until something specific, and pressing to think about is presented. The issue(s) to think about should preferably be real-life issues that can motivate active involvement. This real-life situation should be complex in nature for critical thinking to take place. To do that, Geert and Volman suggest targeting small-groups and adopt discussion, seminars, problem-based learning and role-play approaches (Geert and Volman 2020, 365-6).

The courses that integrate ideas and interdisciplinary approaches in gaining critical thinking are best for enhancing critical thinking skills. However, the skills must have more to do with how the learning objectives are set and used. Geert and Volman further mentioned subjects or courses that emphasized active attribution of meaning, emphasize inquiry and higher order thinking, utilize feedback to increase quality and quantity response by learners. These courses to them, have higher critical thinking scores. Assignments that include class presentations (communication), critical analysis papers (creativity), and essay exams, positively relate to developing critical thinking than the use of multiple choices. In essay writing, instructors differ in the way this approach is perceived and utilized. While critical thinking in exams seeks to observe analytical arguments on related issues, other instructors demand the recollection of the same ideas they taught the learners due to the rudiments of rote learning approaches.

Subjects or Courses should stimulate a high level of participation of learners through praise and use of learners' ideas. Peer to peer interaction (collaboration) is another positive way of gaining critical thinking. High level of involvement in classroom activities has essential effects on the development of higher-order cognitive functions. These principles work more effectively in small group learning settings compared to large classes. A subject or course cannot enhance critical thinking by itself. It is the deliberate effort of the instructor in coming up with appropriate strategies.

Oliveira, Rueda, Carbogim, Rodrigues and Puschel (Oliveira et al. 2016) believe that teaching strategies that give good results in critical thinking involve the use of active methodologies such as setting learning objectives on higher cognitive domains, placing course project papers on issues related to societal challenges in line with the learning objectives, basing learning on the root problems of the learners rather than lectures, and constantly remember that learners are the focus, not the instructor or the course syllabus.

This is calling for Africa instructors to develop, implement, and evaluate new teaching strategies and test existing principles that address the above methodologies in her learning culture. It is when clear strategies are put in place that the development of critical thinking skills can be realized. The need for a multicenter research project for teaching critical thinking skills among teachers is long overdue.

To educate Africa students to be relevant in today's contexts. The government cannot shy away from adopting principles of dealing with a future society she is yet to know. The learning principles must include thinking through complex problems, developing the mind towards specific aims, goals, and reflective learning about the paths the country chooses. There should be an existing concern about teaching pedagogies of the current deficiencies in the schools' educational outcomes. Each country is noticing deficiencies among most graduates when it comes to the application of critical thinking in approaching issues such as; writing, problem-solving, effective professional performance and impacting the society. Amidst the tight schedules of instructors, deliberate steps toward creating time to carefully assess the benefit that learners are deriving from completing assignments that are intended to develop their higher thinking order skills in line with what they are being drilled to become is a need.

It is time to know if the assignments students receive relate to developing their higher order thinking skills that can lead to improving their general academic development. Do the assignments on the development of higher order thinking skills lead to improving job preparation? The desire to think is what brings improvement in critical thinking among learners. Schools need to go beyond the rudiment to read and write on paper and board, to including literacy in computer, culture, digital functional, media, and visual learning skills (Beachboard and Beachboard 2010).

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To appreciate the above steps, critical thinking principles could imply producing learners capable of handling all kinds of information through the ability to locate, interpret, analyze, synthesize, evaluate, and communicate in every subject of a given curriculum. In research, attention is mostly on identifying information needs and behavior rather than ways information is used. Information-seeking and valuing processes are necessary for critical thinking.

Empirical study has affirmed that learners go through nine stages from primary intelligence to systematic cognitive structure towards increasing differentiation and complexity of thinking. It further state four significant categories in the developmental stages in learners as; "dualism, multiplicity, contextual relativism, and commitment within relativism". The study further observed two perspectives deduced in the investigation of critical thinking such as: 1. The development of logical reasoning with arguments, correct inductive and reasonable suggestions. 2. The use of reflective judgment characterized by a problem-solving process that will not necessarily bring about correct solutions since exact reflection results in different options. (Beachboard and Beachboard 2010, 55).

II. KEY TERMS IN CRITICAL THINKING SKILLS

There are outstanding terms in teaching critical thinking that is highlighted with their implications to both instructors and learners.

1) *Interpretation:* This term is the ability to comprehend and express what is comprehended in diverse situations, experiences, data, events, judgments, conventions, beliefs, rules, procedures or criteria.
2) *Analysis:* This is the way of identifying an intended as well as an actual interpretation that relates to statements, questions, concepts, description, or representation that explains beliefs, or opinion and asses the logical strength of an intended conclusion.
3) *Evaluation:* Is being able to assess the credibility of statements or representation that describes somebody's perception, experience, situation, judgment, belief, or opinion and to find the logical strength of an actual or intended conclusion among statements, descriptions, questions, or other forms of representation.
4) *Inference:* Is the ability to identify and secure ways needed to draw reasonable conclusions and form speculations and assumption, to consider relevant information and deduce result from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or any other form of representation.
5) *Explanation:* Is being able to state and justify one's reasoning in terms of the evidence, concepts, method, criteria and contextual considerations which results are based and present one's reasoning in the form of forceful arguments.
6) *Self-regulation:* Is self-consciousness in monitoring one's cognitive activities, applying skills in analysis and evaluating inferential judgments with a view toward questioning, confirming, validating, or correcting reasoning or results (Beachboard and Beachboard 2010, 56).

The activities that go with improving higher order thinking skills include the ability to analyze ideas, theory or situations. Critical thinking involves the ability to work on papers or projects that require integrating ideas using different sources. It can be putting together ideas or concepts using different sources through assignments or class interactions. In synthesis, the learner makes an effort to organize ideas or experiences into new difficult interpretations and relationships. The activity could be making a judgment about the value of information argumentatively to arrive at a sound conclusion. It can also be an act of examining the strength and weaknesses of one's view on a topic or issue. Critical thinking goes with the ability to write clearly and speak effectively as well as thinking critically and analytically. The empirical evidence from this study indicates the need for extra effort on instructors to engage learners using higher order thinking activities in their learning objectives (Beachboard and Beachboard 2010, 57, 65)

Geert and Volman (2020) seem to argue that being critical in approaching issue is part of the western culture. The non-western learners such as developing world like Nigeria can strive to be there through the use of higher learning objectives.

III. MEASURING CRITICAL THINKING SKILLS IN SCHOOLS

Some of the empirical studies that Geert and Volman observed in measuring critical thinking skills are interpretation tests that recognized assumptions, deductions, interpretations, and evaluation of arguments. Instructions that are assumed to enhance critical thinking in this case include, paying attention to the development of the epistemological beliefs of learners; promoting active learning through minimizing the use of lectures, assigning areas of reading ahead of class sessions for learners to comply ahead and come to class ready to share their findings from the readings. The instructor could come up with a problem-based curriculum that can stimulate interaction between learners. There could be real-life issues used to motivate learners to learn. Critical thinking is suitable for experiential, ill-defined, confused and complex problems. This is because the intention is not for an immediate solution to the issues. When learning is placed in the context of meaningful, rich, and specific subject matter using the above characteristic, critical thinking skills can be measured.

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Empirical studies have shown that instructional variables can be retrospectively correlate with learners' critical thinking skills with proofs. Part of the affirmation is the ability to stimulate active involvement and contributions of learners in the learning process, such as elaborate interaction between students to students and students with the teacher. The interaction are the insights that the learners are to present or formulate in an essay exam and not multiple choice exams. Challenges hampering critical thinking application could be limited instructional time, a small sample of issues and the use of too general measuring instruments. Lack of paying attention to the interrelatedness of the curriculum, instructional strategies, the behavior of the instructor, and the climate of the classroom. At times critical thinking program does not result at transferable and durable effects due to the way the subject is specified. When assessment instruments are not divided into tests and self-reports, instructional variables contributing to the development of critical thinking will not result in higher order skills perception. There can be a challenge in the aspect of self-reports that measure critical thinking when skills as 'being able to recognize presuppositions' and 'being able to think about alternatives' are not clearly stated. Another challenge could showcase when the objectives tests do not focus mainly on learner's competence to argue issues consistently and coherently.

Hyytinen found two ways of assessing critical thinking in his empirical study. They are; "self-reports" and "performance-based assessments" (Hyytinen 2015, 14). The two measures have to do with students' abilities. In the self-report, the use of questionnaires and qualitative interviews can be designed for students to view how their abilities have developed within their current learning states. This measurement can be considered indirect; hence, it is not possible to come up with ways learners wrestle with changing their learning experiences. The measures did not capture concrete evidence of changes in learning but present good indicators for academic improvement. The performance assessment are measurements that used tasks that demand learners to construct their response in the form of writing rather than using pre-defined alternatives. The study shows that creating response tasks enhance higher-order thinking and encourage problem-solving compared to multiple – choice tasks.

Constructive approach reveals the learner's level of understanding how to address issues. The act of writing itself is another demonstration of higher-order thinking skills. The performance assessment approach can be used to authenticate assessment since it is an act of thinking that is used in solving complex problems in day to day living. Hyytinen (2015) concords with Cornford when he observes that critical thinking goes with identifying, interpreting, and synthesizing information from sources to arrive at conclusion (Cornford 2007). The constructive approach goes deeper to evaluate and reason on information before coming up with explanations, decisions, and arguments to make.

IV. EXPERIMENTING DESIGNS FOR CRITICAL THINKING IN SCHOOLS

In experimental designs for critical thinking, the following categories were put in place. Pre-experimental design, Quasi-experimental design, and True-experimental design. In pre-experimental design, a case study is included, a one group pretest and posttest design as well as the static – group comparison. In a quasi-experimental design, the use of time-series experiments and none equivalent control group design was applied. This, in other words, means comparing junior secondary school 3 with senior secondary School 6.

In true-experimental design, the use of pretest and posttest control group design was included. The control group here could mean examining groups of common goals or achievements. Among the three designs, the true – experimental design affirmed reliable and powerful hence it involved two or more different groups, the use of random samples and the design control time and group related threat. The random selection and assignment of participants in an empirical study indicate claims that statistical differences can contribute to the treatment; this is because the method was used to control possible differences between the treatment and the control group. The pre-experience did not have a control group and random assignment and was more vulnerable to threat. The quasi-experiment also lacked random assignment and was vulnerable to certain internal validity and group related threats. The use of this approach did not indicate a limitation of research design and concluded without addressing threats to the validity (Behar-Horenstein, Linda, 2011).

Behar-Horenstein and Linda attest that critical thinking cannot be developed within a limited period like four months. There is a need for a reasonable period for a significant change to manifest. This significant period could mean introducing the skills right from the elementary to tertiary levels. The identification of patterns and commonalities in research is to create more fine-tune studies in critical thinking using varied instructional approaches. The limitation outcomes are to encourage more research designs.

Findings are not enough to influence change in critical thinking. It is the implementation of the outcomes. Behar-Horenstein and Linda further observed that critical thinking skills development do not rely solely on quantitative findings when it comes to instructional approaches on the appropriate teaching methods. This is because changes in students' behaviors cannot be detected through statistical measures alone.

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The quantitative approach may be easy to use but is limited when it comes to capturing critical thinking changes in specific disciplines that emphasized character development (affective) and the use of skills (psychomotor). Therefore, the advantage of qualitative approach comes to play. In using the standardize Watson Glaser Critical Thinking Appraisal (WGCTA) and California Critical Thinking Skills Test (CCTST) the need to come up with a purpose of the single test measure is not enough to capture learners' critical thinking development. In combining the measures, there is still the need to come up with a justification for the combination; hence such approach will help in measuring changes in critical thinking more comprehensively.

Behar-Horenstein and Linda went further to recommend the use of multiple instruments, open-ended questions, essays, interviews, observation, and discipline. Specific instruments which an instructor can develop to help his findings and describe the practical significance of the treatments. The use of non-standardized tests should not be frequent; hence it demands subjective scoring and is hard to come up with reliability and validity (Behar-Horenstein, Linda 2011, 32-3).

In a quasi-experimental design, both the research design and methodology are necessary; hence such approach could strengthen thoughtful elements that reduce the number and probability of internal valid threats. In using a pretest, the careful selection of the control groups could facilitate causal suggestion from quasi-experimental designs for acceptable internal validity threats. The control of extended treatment can lead to controlling maturation and history threats for stronger impact in terms of the period between pretest and posttest (Behar-Horenstein, Linda S. 2011, 38).

V. REFLECTIVE TEACHING APPROACH IN SCHOOLS

In a reflective teaching approach, Cornford (2007) attests that it prepares teachers to be thoughtful. The approach is active and improves teaching and learning. Reflective teachers never get tired of experimenting and adopting new skills. They are active researchers, who see themselves as applied scientists, moral craftsmen, problem solvers, hypothesis makers, clinical inquirers, self-analytic, pedagogies, political artisans, and scholars. To improve teacher education on a reflective approach to teaching, Cornford suggests the use of both quantitative and qualitative research findings. Objectives in teaching enhance the use of quantitative measurement in the use of a particular teaching method or mediation. A testing of standards opposes reflective approaches in teaching but testing conflicting standards to determine the most relevant and useful standard for educational practice. Teachers cannot develop their teaching profession unless effective use of reflective teaching approaches are applied.

Empirical studies attempted to quantify the effect of reflective thinking programs starting from the thought of the teacher at the beginning of his teaching and classroom performance has never been encouraging. Reflection has been found not related to teaching performance. Recent graduates' teachers were compared with older teachers who teach in conventional colleges and colleges that implement reflective teaching programs, and the comparison showed no difference between the groups in attitude to reflection and inclination towards innovation.

Reflective teaching college group, irrespective of the duration of teaching, was rated to have better teacher-student relationships. Reflective teaching in the teacher education programs that increases reflect thinking did not automatically achieve the objective. Reflection then is not found to be enhanced by training. The study did not ascertain whether superior verbal reasoning skills were translated into superior practical performance in real life classrooms. Modeled performances, micro-teaching, and videotaped feedback would have helped positively, but they too are limited and technical in nature. Learners who enrolled in reflective programs with a higher level of reflective abilities think and talk better in terms of teaching and reporting their feelings with less fear in the subject that requires that.

Conford (2007) in this context, views reflective learning skills as a deliberate learning principle for learners to be guided into and be able to appreciate the outcome in their everyday living. Though the concept of reflective thinking varies when it comes to individuals acquiring and processing information yet, those who understand the skills and put into use are better up in terms of having reproduced ideas in their different areas of expertise. Reflection usually rests on something to think about and having the ability to engage it in critical thinking.

Applying systematic, reflective thinking in teaching rests on an in-depth understanding of the classroom atmosphere; this implies that teaching and related learning tasks must align for effective reflective teaching to happen. The process goes back to the way learning contents are selected and used in the teaching experiences. When the two principles are put in place, teaching and learning become more relevant. In the context of Nigerian education, instructors need to be reminded that each learner walks into the class with skills and the necessary knowledge for effective critical thinking ready to be taught and developed for use (2007). All that is left are ways to enhance the skills. There is a need for more creative and effective thinkers for productive output in Nigeria and Africa. Creative and reflective thinkers come to be when the teaching process creates that atmosphere. It is not enough for teachers to settle for learning objectives only, reflective teaching principles must be in place to achieve a quality result.

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To attest that reflective teaching and learning is a relevant tool in educational learning settings, Hyytinen adds; "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends" (Hyytinen 2015, 5). In other words, the learner must have the ability to relate what is taught using his analytically needs and options for making a decision. Critical thinking does not intellectualize solely by using a prescribed set of skills. It goes beyond that to comprehensive use of different types of knowledge; this implies that learners should not limit their knowledge to their areas of discipline alone but read materials that relate to other disciplines for informed decisions.

There is a difference between propositional knowledge and procedural. While propositional knowledge is defined as; "knowing that such and such is the case" (Hyytinen 2015, 6), and sometimes refers to as declarative, procedural knowledge is knowing how to do something by way of analysis and solving problems. The affirmation of skill acquisition comes to play when a learner can reflect both procedural and propositional knowledge to be considered a critical thinker.

VI. SUMMARY

In this context of critical thinking skill, reflective teaching and learning skills are deliberate learning principles for both instructors and learners to be guided into and be able to appreciate the outcome in their everyday living. Though the concept of reflective thinking varies when it comes to individuals acquiring and processing information yet, those who understand the skills and put into use are better up in terms of having reproduced ideas in their different areas of expertise.

Reflection usually rests on something to think about and the ability to engage it in critical thinking. Applying systematic, reflective thinking in teaching rests on an in-depth understanding of the classroom atmosphere; this implies that teaching and related learning tasks must be aligned for effective reflective teaching to happen. The process goes back to the way learning contents are selected and used in the teaching experiences. When the two principles are put in place, teaching and learning become more relevant.

In the context of Africa learners, Cornford (2015) believes that each learner walks into the class with skills and the necessary knowledge for an effective critical thinking ready to be taught and developed for use. Africa has gotten enough academicians with theories and mastery of facts but lacks scholars that can think critically. Until Africa make a paradigm shift from the 3Rs to the 4Cs with emphasis on critical thinking skills, poverty, tribalism, religious biases, insurgences etcetera will continue to engulf the continent. Most graduates will not assume that their education is either for blue or white collar jobs outside their rural contexts.

Creative and reflective thinkers are bound to be developed in Africa when the teaching process creates that atmosphere. It is not enough for teachers to settle for learning objectives only, reflective teaching principles must be in place to achieve quality result. To attest that reflective teaching and learning is a relevant tool in every learning setting.

Hyytinen further builds on reflective thinking to say; "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends" (Hyytinen 2015, 5). In other words, the learner must have the ability to relate with what is taught to his analytical needs and options for making a decision. Critical thinking does not intellectualize solely by using a prescribed set of skills. It goes beyond that to comprehensive use of different types of knowledge. This implies that learners cannot limit their knowledge to mastery of facts and theories which is a teacher-centered approach to how best the God-given ability can improve in learners for informed decisions. Africa can wear a new face if the right pegs are put in the right holes. In other words, it is time for Africa to define her context and develop a curriculum that can help learners solve their problems rather than spending energy on preparing learners for job acquisition in a dangling economy.

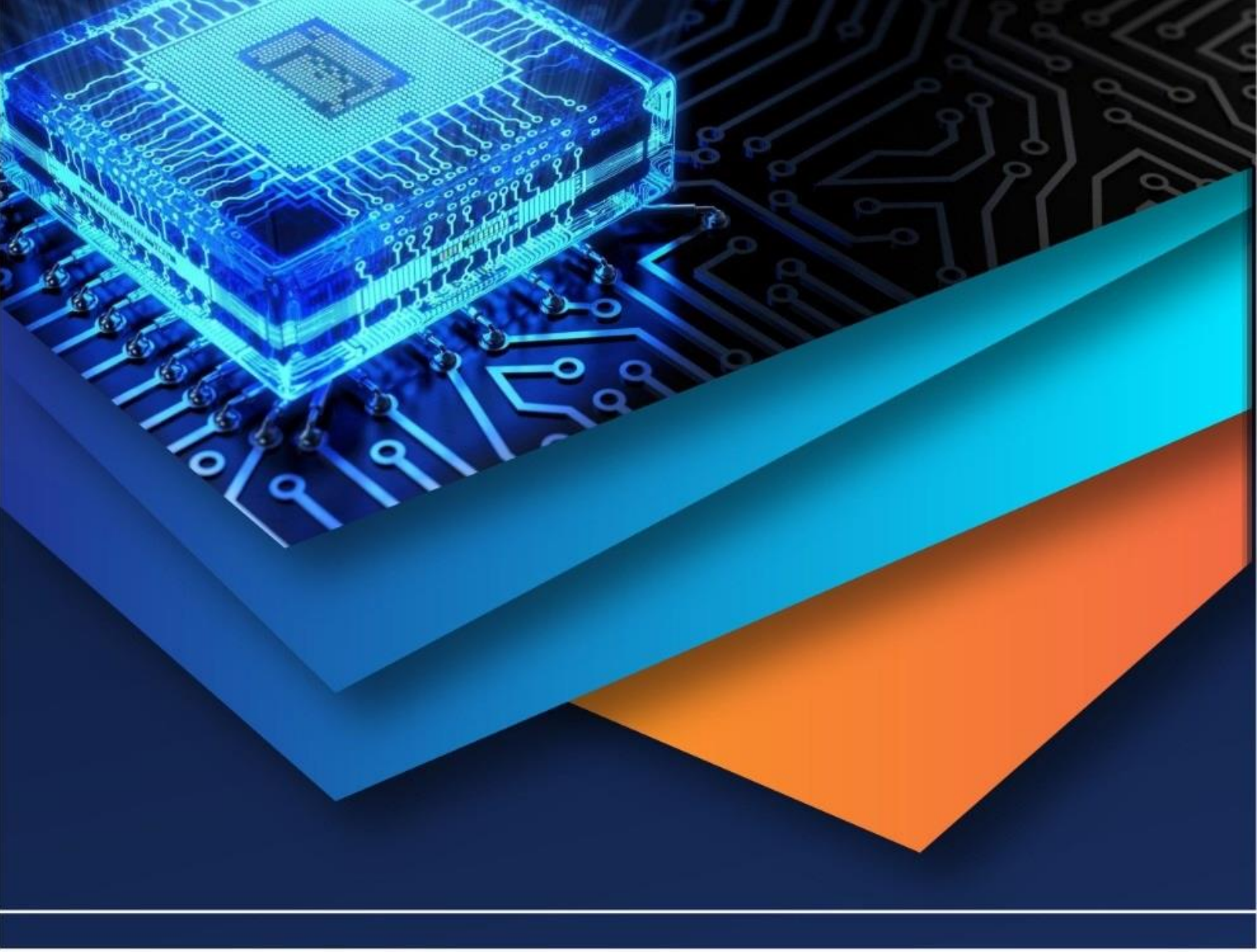
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