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EXPLORING CONSTRUCTIVISM APPROACH TO IMPROVING TERTIARY INSTITUTIONS COMPUTER SCIENCE STUDENTS LEARNING ACHIEVEMENT

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Abstract

The study focused on constructivist approach where learners are actively involved in a process of meaningful knowledge construction as opposed to passively receiving information. This study investigates the level use of constructivist teaching awareness, usage, benefits and barriers on tertiary institution computer science student learning achievement in tertiary institutions. The population of this study comprised all computer science lecturers in tertiary institutions in Abeokuta, Ogun State, Nigeria. A simple random sampling technique was used to select fifty computer science lecturers. The study made use of three research questions with a self constructed questionnaire to elucidate respondents' opinions. Simple statistics mean was used to analyze the information gathered. The findings revealed that the majority of the institutions and their lecturers do not ***adopt constructivist approach as a teaching method but*** *they were aware of the constructivists approach as teaching method, that constructivist approach to teaching positively impacts student achievement regardless of intelligence levels by promoting active collaborative engagement, student motivation, critical thinking and problem solving skills, that the lecturers do face some barriers like uneven attitudes on group work and assignment, large class sizes, inadequate lecture time and shortage of practical educational materials as a hand on approach coupled with students' preference for conventional lecture method militates against adoption of constructivist based approach. Based on the findings, there is need for curriculum design build on learners centre that emphasizes active learning, critical thinking and interdisciplinary approaches that align with constructivist principles, adequate funding to cater for technological materials.*

Keywords: Constructivist Approach, Learning, Teaching Method, Student Achievement, Tertiary Institution

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Introduction

Teaching methods can be seen as the active learning guidelines that discuss the benefits of active learning, as well as providing guidelines and samples activities that facilitate active learning. Kimweri (2018) defined teaching methods as a variety of ways of organizing the participants and the type of methods to be used to facilitate learning process which are determined by different factors such as number of students, age and the topic to be taught. It is also defined as the strategy or plan that outline the approach that teachers intend to take in order to achieve the desirable objectives (Osokoye, 2016). (Oigara, 2019) categorized teaching methods into teacher-centered approaches and learner centered approaches. Teacher-centered approaches include lecture method, drilling and questioning where teachers teach and later examine taught concepts by giving students exercises related to the teacher's presentation during or after the lesson. learner centered approaches include project-based teaching, the brainstorming method, differentiated instruction, inquiry-based learning, expeditionary learning, game-based learning, where teachers still serve as an authority figure, but may function more as a facilitator or "guide on the side," as students assume a much more active role in the learning process.

Academic achievement refers to the ability of pupils to study, remember facts and be able to communicate their knowledge verbally or through writing. According to Musek (2017) academic achievement objectively refers to numerical scores of pupil's knowledge, which measures the degree of pupil's adaptation to school work and to educational system and subjectively academic achievement is determines in reliant upon the pupils attitude towards the academic achievement. Santrock (2016), academic achievement refers to what the students have learned or what skills the student has learned and is usually measured through assessments like standardized tests, performance assessments and portfolio assessments.

Constructivism theory attributed to Jean Piaget who articulated mechanisms by which knowledge is internalized by learners. Piaget (2010) opined that through processes of accommodation and assimilation, individuals construct new knowledge from their experiences. In a constructivist class, teacher provides the students with real and meaningful problems and encourages them to present various solutions, seek help from classmates, and introduce the best solution. Constructivism is an approach to learning that puts emphasis on learner's activeness in establishing knowledge and comprehension (Santrock, 2004). Constructivist learning is an internal dynamic process whereby the learners actively

"construct knowledge" by linking new information with what they have previously learned (Hosseini, 2009).

In a study carried out by (Colburn, 2015) on undergraduates in a large lecture hall setting, it was found that only 20% of the students retained what the instructor discussed after the lecture. They were too busy taking notes to internalize the information. In the constructivist learning environment, technology as in the technology-assisted classrooms, project-based training, methods and techniques are collaboratively used at the highest level in order to make learners active (Means and Olson, 2015). Collaborative for Excellence in Teacher Preparation (CETP) (2013) stated some strategies to follow for constructivist teaching as Oral Discussion, KWL(H) Chart: (What We **K**now. What we **W**ant to Know. What We Have **L**earned. **H**ow We Know It.), Mind Mapping (concept mapping, webbing), Hands–on Activities, Paper and Pencil Pre-tests, Field Trips, Films, Research, Discovery, Discrepant Event, Brainstorming and Testing, Problems, Graphic Organizers, Investigation, Journals, Discussion, Role playing, Report, Presentations, Skits, and Application for tertiary institution computer science students.

Kim (2015), Pritinanda (2017), (Dhindsa and Emran, 2016) & (Spector *et. al.* 2015) all have remarks in publications, notably produced in Europe and America, confirming constructivist-based teaching as an efficient techniques to arrange learning activities. Healey and Jenkins (2010) opined that learning cycle if used as an instructional method for teaching computer science would be a suitable alternative for the lecture method which has dominated the science classrooms with the intention to improve students' achievement. Folasade and Akinyemi (2019) opined that constructivist learning technique is more efficient, and that no significant difference in performance of senior secondary school male and female physics students taught with constructivist approach.

Statement of the problem

The commonly used teaching methods especially in developing countries are teacher centered (Guloba, Wokodola, and Bategeka, 2015), which are viewed to be somewhat ineffective in the impartation of knowledge. Effective teaching methods, including the different types of teaching methods, are essential for ensuring that students are able to learn and apply new concepts and skills. Learning cycle constructivist-based approach, an inquiry-based teaching model based on Piaget (2010) developmental theory are useful for teachers in designing curriculum materials and instructional strategies in science. Thus, this study seeks to

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investigate the constructivist based teaching approach awareness, usage, benefits and barriers on tertiary institution computer science student learning achievement in tertiary institutions.

Research Questions

1. What is your level of awareness and usage of constructivist based teaching approach in tertiary institutions?
2. What are the perceived benefits of using constructivist based teaching approach on computer science student academic achievement?
3. What barriers do lecturers face in applying constructivist based approach as a teaching method for the student?

Methodology

This study made use of descriptive survey research design. This is important because it involves a systematic collection of facts and accurate information or data about a given population or areas of interest, object or class of events in other to analyze, describe, compare and contrast and to interpret the facts without manipulating any variable.

The population for the study consisted lecturers in selected tertiary institutions in Abeokuta, Ogun State, Nigeria and simple random technique was used to select ten (10) lecturers each in the computer science department from five tertiary institutions making a total of fifty (50) respondents.

The research instrument for this study was a self-structured questionnaire. It is designed in a modified Likert Scale format, having a four-point rating scale of Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD) respectively. The questionnaire consisted of sections A and B. Section A was designed to seek information about respondents' personal data while section B consisted of items designed to seek for the responses on correlate issue on exploring constructivist teaching approach: level of use, benefits and barriers on tertiary institution computer science student learning achievement. The items on the questionnaire sought negative and positive responses based on the subject matter.

Validity and Reliability of the Research Instrument

The questionnaire constructed was tested during the pilot face validity survey conducted with the target population but from schools not part of the drawn sample. Possible problems that were likely to be encountered during the research were noted and rectified.

Data Analysis

Data collected were analyzed using descriptive mean statistics to answer the research questions statements.

Table 1: Mean responses on the level of awareness and usage of constructivist based teaching approach in tertiary institutions.

S/N	STATEMENT	SA 4	A 3	D 2	SD 1	Mean Σfx/N	Remark
1	I am aware of the constructivist based method of teaching.	24 96	15 45	6 12	5 5	3.16	Agreed
2	My tertiary institution has adopted constructivist-based approach where students engage with learning materials before class, and then use class time for active, collaborative problem-solving.	8 32	4 12	18 36	20 20	2.00	Disagreed
3	**I do adopt constructivist based method of teaching.**	5 20	5 15	22 44	18 18	1.94	Disagreed
4	Constructivist approaches often emphasize collaborative learning, and integrates group projects, peer feedback, and cooperative learning into their programs.	30 120	11 33	4 8	5 5	3.32	Agreed
5	My institution encourages constructivist approach where students actively construct their own understanding through scientific inquiry research.	32 128	10 30	4 8	4 4	3.4	Agreed
		Average Mean =				2.76	

SOURCE: Field Survey (2024).

Based on Table 1 above, the means of items 1,4 & 5 were higher than 2.50 which indicates that the items were accepted by the respondents, also observed that the means for items 2 & 3 were less than 2.50 indicating their rejection by the respondents. But the weighted average of 2.76 of all the means is above 2.50.

Table2: Mean responses on the perceived benefits of using constructivist based teaching approach on computer science student academic achievement.

S/N	STATEMENT	SA 4	A 3	D 2	SD 1	Mean Σfx/N	Remark
6	Constructivist approach to teaching science positively impacts student achievement, regardless of intelligence levels, by promoting active engagement, deep understanding.	26 104	22 66	0 0	2 2	3.44	Agreed
7	Collaboration and social skills development of constructivist based teaching approach improve student academic achievement.	15 60	35 105	0 0	0 0	3.3	Agreed
8	Constructivist based teaching method promote student motivation and self confidence.	11 44	37 111	2 4	0	3.18	Agreed
9	Student development of critical thinking and problem solving skills are encouraged through constructivist based teaching approach.	12 48	37 111	1 2	0	3.22	Agreed
10	Development of autonomy and lifelong learning skills of constructivist based teaching approach has a positive effect on achievement.	11 44	38 114	1 2	0	3.2	Agreed
		Average Mean =				**3.27**	

SOURCE: Field Survey (2024).

From Table 2 above, the means of items 6 to 10 were higher than 2.50 which indicates that all the items were accepted by the respondents, and the average mean was 3.27 was also higher than 2.5.

Table3: Mean responses on the barriers lecturers do face in applying constructivist based approach as a teaching method for the student.

S/N	STATEMENT	SA	A	D	SD	Mean Σfx/N	Remark
11	Students uneven attitudes on group work and assignment militate against full benefits expected from constructivist based learning approach.	29 116	15 45	2 4	4 4	3.38	Agreed
12	Large class sizes of students is a problem faced by constructivist based approach.	13 52	30 90	0	7 7	2.98	Agreed

13	Inadequate lecture time for activities characteristics of constructivist based approach pose a challenges to its use.	16 64	28 84	1 2	5 5	3.1	Agreed
14	As a hand on characteristics approach, shortage of practical educational materials might be a problem.	9 36	33 99	3 6	5 5	2.92	Agreed
15	Student's preference for conventional lecture method militates against adoption of constructivist based approach.	17 68	22 66	1 2	10 10	2.92	Agreed
		Average Mean =				3.06	

SOURCE: Field Survey (2024).

Table 3 above showed that the means of items 11 to 15 were higher than 2.50 which indicates that all the items were accepted by the respondents, and the average mean was 3.06 was also higher than 2.5.

Discussion of findings

This study investigated level of awareness, usage, benefits and barriers of constructivist teaching approach on tertiary institution computer science student learning achievement. The data for the study were analyzed using simple mean.

Based on the research question 1 item responses, the majority of the institutions and their lecturers do not **adopt constructivist approach as a teaching method but** they were aware of the constructivists approach as teaching method and agreed that constructivist approaches often emphasize collaborative and cooperative learning where students actively construct their own understanding through scientific inquiry research. Children learn best when they are allowed to construct a personal understanding based on experiencing things and reflecting on those experiences (Tobin & Tippins, 2013).

From the research question 2 items responses, the respondents agreed that constructivist approach to teaching positively impacts student achievement, regardless of intelligence levels, by promoting active collaborative engagement; promote student motivation and self confidence, critical thinking and problem solving skills. Kim (2015) constructivist teaching is more efficient than traditional method with some effect upon motivation anxiety towards learning and self monitoring.

The research question 3 responses revealed that the lecturers do face some barriers in applying constructivist based approach as a teaching method for the student. These include students' uneven attitudes on group work and assignment, large class sizes, inadequate lecture

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time and shortage of practical educational materials as a hand on approach coupled with students' preference for conventional lecture method militates against adoption of constructivist based approach. Chris (2024) it doesn't fit with standardized tests, it is time consuming and it requires differentiation, which is resource intensive also J

Conclusion

From the findings in the study, majority of the lecturers are aware of the constructivist based method of teaching, few of the institutions and the lecturers are yet to adopt it as a teaching approach but they encourage constructivist where students actively do project through scientific inquiry research.

Constructivist approach to teaching science positively impacts student achievement, regardless of intelligence levels, by promoting active engagement, deep understanding promote student motivation and self confidence, development of critical thinking and problem solving skills are encouraged and autonomy and lifelong learning skills.

As revealed from the study, constructivist based approach as a teaching approach is faced with problems of inadequate lecture time for activities, shortage of practical educational materials, large class sizes, students uneven attitudes on group work and assignment as well as students preference for conventional lecture method.

Recommendations

In line with the research outcomes, the following were recommended

1. There is need for emphasizes active learning, critical thinking and interdisciplinary approaches that align with constructivist principles.
2. There is need for adequate for technologies and materials that support constructivist learning that enable collaborative and experiential learning.
3. Lecturers should foster learning spaces that encourage group work and discussions to enable sharing perspectives and co-constructing knowledge among the students.
4. Learning curriculum should majorly build on learners centre as against teacher centre to facilitate discussions, pose challenging questions, and help students reflect on their thought processes rather than simply providing instruction as in lecture method.

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