

STUDENTS-CENTRED METHODS OF TEACHING ARCHITECTURE STUDENTS THEORY OF STRUCTURES IN NIGERIA UNIVERSITIES

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Abstract

This study was undertaken to obtain the responses of students through questionnaires on the teaching methods employed in theory of structures in Department of Architecture, Federal University of Technology, Akure. The first section of the questionnaire consist of questions on the four current teaching methods while second section asked for the opinion of the respondents on other six teaching methods that can be employed in the course delivery. Four Likert scale response was employed. A random selection of 90 undergraduate students was made from part two undergraduate students in 2012/2013 session. 81 out of 90 administered questionnaires proved useful. The study observed that the reliance on one teaching method is restrictive to students learning. Also, the lecturers have not been making use of modern technologies in delivering their lectures. The paper therefore, recommends the urgent need for lecturers to be acquainted to modern lecture aids and equipment. Also, the use of different teaching methods entrench students learning.

Keywords: Architecture, Nigeria, Teaching methods, Theory of Structures

1. INTRODUCTION

Architectural education in Nigerian was started by few United Kingdom trained Nigerian architects shortly before independence. Since then, different architectural schools in Nigeria have adopted the strategies, methods and materials that were used to train them in United Kingdom (Olotuah and Adesiji, 2005; Olotuah, (2001). For instance, many of the architectural textbooks that were used then are still in use. In the universities, theory of structures is one of the core courses that the students are to offer at undergraduate level. In Federal University of Technology, Akure, the students are to offer the course in both semesters as Theory of Structures I and II (ARC 211 and ARC 212 respectively).

However, the courses (ARC 211 and ARC 212) entail empirical introduction of structural terms and building structural systems to architectural students. In ARC 211, the students are adjudged not to have known anything about building structures while in ARC 212, the students are taught structural theories and calculations that are more detailed and complex. This is why Afolami, Olotuah, Fakere and Omale (2013) submits that impartation of the knowledge of building structures into architecture students is essential and germane to the production of competent, skilled and versatile architects that are capable of understanding the need of functional and stable buildings to house the teaming population of Nigerians.

Therefore, Horng, et al. (2005), argued that the concept of students-centeredness must be a key factor in new teaching strategies and curriculum design. Also, Jeffries, (2007) reaffirms the need for new teaching methods in the teaching of theory of structures to increase creative thought. There is a consensus on the necessary introduction of the concept of student-centeredness in higher education because the concept makes the students the focus of knowledge impartation and productivity is measured through the performance of the students. This brings about new ideas that have been adapted to varying peculiarities of the students. Hence, this study sought to review the current methods of teaching of theory of structures in Federal University of Technology, Akure, Nigeria and suggests ways of refocusing them in enhancing learning.

1.1 Statement of the Problem

Many writers on architectural education have observed that the teaching of theory of structures is failing in meeting the yearnings and needs of the students, societies, cultures, environments and technological developments. Afolami, Olotuah, Fakere and Omale (2013) revealed that many of the methods of teaching theory of structures in Nigerian universities are gradually turning obsolete with attendant adverse effects on students' performance in the course. In solving the problem, there is a need to bring students-centred changes that will offer enhanced opportunities for students to learn. In addition, there is a great need for architectural schools to train students and young architects to relate appropriately to the society and develop appropriate architecture for local and peculiar environments. Therefore, the purpose of this study is to devise ways of improving student-centeredness on the existing teaching methods and propose other methods that can be used in teaching the course to produce well-grounded architects that will creatively solve the problems of building collapse in our society.

1.2 Objectives of the Study

The objectives of the study are:

- i. To find out various teaching methods used by university teachers to teach theory of structures.
- ii. To explore the opinion of students on the student-centeredness of the in-use teaching methods.
- iii. To offer suggestions on improving student-centeredness of the existing teaching methods.
- iv. To propose other methods that can be employed in the teaching of theory of structures.

2. RESEARCH METHOD

There are 126 students that offered the course in 2012/2013 session, out of which 90 students were randomly selected as respondents. Then, questionnaires were administered to the respondents in which 81 questionnaires were useful. The questionnaire covers questions on the current teaching methods employed by the course lecturers in Section A while Section B requests the respondents to give their opinions about eight different teaching methods that can as well be employed by the course lecturers. The frequency value of each response was determined. The mean response value was also determined by dividing the frequency value of each response by the number of usable questionnaires. In addition, the study explores relevant literatures from architectural education researchers.

3. RESULTS

3.1 Current Teaching Methods for Theory of Structures

3.1.1 Lecture method

Sajjad (2010) reiterates that lecture is a talk or verbal presentation given by a lecturer, trainer or speaker to an audience. This is a widely used method of teaching. Even, in universities, teachers are widely called lecturer denoting someone that gives lectures. Osakinle, Onijigun and Falana (2010) described the method of teaching as one that is suitable for pre –university level of education. Olotuah and Adesiji (2005) supported this assertion saying this method involves limited teachers-pupils interactions. In Nigeria, this method has been widely used due to high population of students per class where the lecturers cannot afford to have one-on-one interaction with each student (Osakinle, Onijigun and Falana, 2010 and Afolami, Olotuah, Fakere, Omale, 2013). Data obtained as indicated in table 1 show that 24 out of 81 respondents disagreed that the method helps in creating new ideas while 41 out of 81 respondents also disagreed that lecturers provides all knowledge related to topics in the course. 55.56% of the respondents agreed that the course lecturers create fear in the use of the method. 66.86% of the respondents disagreed that the lecturers make use of modern lecturing equipment in delivering lectures. The mean response value for lecture methods ranges between 1.75 and 3.16. The study reveals that lecturers are not making use of modern lecturing equipments that are capable of improving quality of lectures. This means, the lecturers still provide lecture notes to the students which can be likened to be an old practice.

3.1.2 Assignment Method

In the teaching of theory of structures, lecturers make use of this method to check the level of understanding that the students have got in a particular topic. In the words of Afolami, Olotuah, Fakere, Omale (2013), assignments were given to students at strategic times within the semester to determine students' level of understanding and for the fact that the students are not to submit answers immediately; the students are availed opportunity to be actively involved

in learning while in their respective residences. In table 2, 65.44% of the respondents agreed that lecturers give adequate time for tests while 88.88% agreed that assignment method has helped them to be engaged in active learning. The respondents also, revealed that the assignments were within the scope of the taught topics. The mean response value for assignment method ranges from 2.84 to 3.06. The study reveals that the interest and understanding of the course has been entrenched by giving assignments to students. The students are enabled to engage in active learning while in their dormitories to ensure that solutions are proffered to the assignment questions.

3.1.3 Test/Quiz Method

This method is similar to assignment method. Here, the students are given limited time to proffer solutions to the questions given by the lecturer. This method is best used to determine the instantaneous understanding that the students has derived from the topic that has been taught. Also, it offers quasi-examination atmosphere in other to acquaint the students to similar examination situation. 76.45% and 76.54% of the respondents agreed that the method brings about in-depth understanding of the taught topics and entrenches students' participation respectively (Table 3). Also, the method was rated good for large class by 67.90% of the respondents. The mean value of test/quiz method ranges from 2.75 to 2.96.

3.1.4 Case study Method

Case method is a powerful student-centered teaching method capable of imparting students with critical thinking, communication, and interpersonal skills. Having students work through complex, ambiguous and real world problems acquaint the students with the course material, encourages them to see the case(s) from an action perspective, rather than analysing it from a distance (Schwartz, 2012). Case studies are multidisciplinary and allow the application of theoretical concepts that has been taught in class therefore, bridging the gap between theory and practice. For instance, some existing structures were used as case studies during theory of structures II (ARC 212) in 2012/2013 session. The students were to physically visit the case studies, take pictures and sketches to study how different structural elements in their case studies relate to ensure structural stability of the building. Eigbeonan (2013) submits that case study method increases student proficiency with written and oral communication, as well as collaboration and team-work. In table 4, larger percentages of the respondents agreed that the method entrenches in-depth understanding (87.66%), encourages creative thinking (85.19%), offers more information about the taught topics (86.42%) and allows application of what was taught in lecture rooms (75.31)

4. DISCUSSIONS OF FINDINGS

4.1 Improving Current Teaching Methods

Various departments of architecture in Nigerian universities has recently seen the need to improve the existing teaching methods being employed in the teaching of theory of structures due to noticeable droppings in the performances of students in the course (Afolami, Olotuah, Fakere, Omale, 2013). Therefore, the student-centeredness of the current teaching methods can be improved as follow:

4.1.1 Lecture method

With all the advancement in Information and Communication technology, lecture method is still the main teaching method widely used in higher level of education. Sajjad (2010) claimed that this method is economical, can be used for a large number of students, material can be covered in a structured manner and the lecturer has a great control of time and material. In view of this, the method can be improved by ensuring that the lecture materials are stimulating and thought provoking. Also, the lecturers are to ensure the use of modern lecturing equipment, diagrams, sketches, figures and pictures to give explanations and take feedbacks from the students in other to adapt the method to the peculiarities of students and environment. In other words, lecturers should ensure that friendly atmosphere prevails between the students and lecturers. This will enable the students to approach the lecturers for more information on the taught topics and allow them to make input on the topics to be taught. This will encourage the students to develop interest in the topics.

4.1.2 Assignment Method

Written assignments help in organization of knowledge, assimilation of facts and better preparation for examinations. It emphasizes on individual student work and the method helps both teaching and learning processes (Kochhar, 2000). Lecturers should describe the parameters of the topic of assignment to provoke the students to think

creatively. Davis (1993) suggests that assignments should recognize students' diverse backgrounds and special interests. Also, the main importance of assignment method is to engage the students in active learning after academic hours, therefore, allotted time for submission should be adequate for students not to be pressured since there may be other assignments in other courses.

4.1.3 Test/Quiz Method

This method enables the lecturer to measure the level of understanding derived by the students. Using test/quiz method, the lecturers are to ensure that the allotted time enables quick thinking and solution to the test/quiz should be done immediately after the students have submitted their answers. The allocated time for submission of test solutions are to be kept short because the main essence of the method is to allow quick thinking for solutions to problems. Also, solving the test questions can involve students' participation to further entrench the understanding of the topics.

4.1.4 Case study Method

This method is basically used to develop critical thinking and problem-solving skills, as well as to present students with real-life situations. Sajjad (2010) submitted that the students are presented with a record set of circumstances based on actual event or an imaginary situation to diagnose particular problem(s) only or to diagnose problem(s) and provide solution(s) or to give reasons and implications of action after providing both problem and solution. It is a time consuming method and sometimes the case does not actually provide real experience. But can be improved if the lecturer contextually analyse the case study prior to presentation of the case study to the students for studies. Also, the cases should be brief, well-written, reflect real issues, and open to a number of conflicting responses and the students should work in group to prepare a written report and/or a formal presentation of the case.

4.2 Other Students-centred Teaching Methods

4.2.1 Discussion method

Sajjad (2010) defined this method as a free verbal exchange of ideas between group members or teacher and students. For effective discussion, the students should have prior knowledge and information about the topic to be discussed. One of the strengths of this method as stated by McCarthy (1992) is encouragement of various ideas and experiences from group and allows everyone to participate actively in the topic under discussion. Kochhar (2000) stated that problems where there are differences of opinion are suitable for discussion method of teaching. According to Sajjad (2010), ways of enhancing discussion method include:

- i. The teacher should spend sufficient time in preparing the process and steps of discussion.
- ii. Different aspects of the topic and the parameters should be selected for the focused discussion.
- iii. Sufficient time should be allotted to discuss all the issues. At the same time students should know the time limit to reach a conclusion.
- iv. The teacher in the beginning should introduce the topic, the purpose of discussion, and the students participating in discussion.
- v. Before the start of discussion, background information about the topic should be provided.
- vi. There is a need to include questions to provide direction.
- vii. Relaxed environment should be created to foster the process of discussion

4.2.2 Practical example method

Students have expressed concern regarding the need for more industrial and practical examples to reinforce theory in the classroom. The use of practical examples can help you connect structural theory with practical applications for more effective teaching and learning. The introduction of practical examples does not imply an elimination of theory, but rather an enhancement of the theory taught in the classroom. It is important to simultaneously develop a theoretical and a practical base since neither is useful without the other. The use of practical examples in the classroom is targeted to help illustrate and explain new concepts being introduced and to teach students how to apply the theories that were taught in classroom to real life issues. Practical examples can be included at all levels of theory of structures curriculum. When determining examples to be used for instruction it is important to make the examples as clear and straight forward as possible. The key is to make the examples as simple as possible, and to make sure that they isolate the desired principle. Whenever possible, the examples should be designed so that the students' physical senses are brought into play. Examples that are likely to be enjoyed by the students include those that require them to use their sense of sight, feeling, hearing or smell.

4.2.3 Show and Tell methods

The "Show and Tell" technique is another form of the "Practical Examples" technique. However, in this technique the role of the student is reversed to that of a lecturer, thereby changing their perspective of the problem. The basic premise of the "Show and Tell" technique is that if one can explain a concept to someone else then he/she truly understands the concept (University of Wisconsin, 2005). A typical "Show and Tell" project would require a student or a group of students to explain a given theory or phenomenon to the rest of the class and also demonstrate a physical example that helps visualize the phenomenon. Almost any example that you can convincingly demonstrate in a classroom would be appropriate for a "Show and Tell" project. The purpose of this exercise is to challenge the students to come up with a creative solution to the problem at hand without overwhelming them. In order to avoid embarrassing situations and to ensure that the demonstrations are useful to the entire class, it is also important to know beforehand what the students plan to present. Putting the students into the role of a teacher makes the students look deeper into the assigned problem. The students will be forced to clarify their thinking and understanding since they must explain to their peers the phenomena that they are demonstrating. In searching for examples outside of class or for demonstrations that can be performed in class, the students will be compelled to look for connections between theory and practical applications.

4.2.4 Guided Design Projects Method

Guided designs projects aim to bring practical design experience into the classroom. Often conducted over a period of a semester, the projects give students an opportunity to work in a team environment, apply theories learned in the classroom, and learn about design methodologies. Guided design projects are appropriate for any level. One of the best ways to have students appreciate the design methodology is to have them redesign existing structural systems of buildings.

4.2.5 Brainstorming

It is a loosely structured form of discussion for generating ideas without participants embroiled in unproductive analysis. The brainstorming technique is widely used in academics to encourage participants to generate ideas in an unhindered manner. In an academic context, brainstorming encourages students to participate actively in idea-generation exercises and experience benefits of a multi-dimensional approach to analysing problems or solutions. The method can be applied in structured, unstructured or group forms. It is a very useful technique for problem solving, decision making, creative thinking and team building. It develops listening skills. According to Sajjad (2010), ways of enhancing discussion method include:

- i. There should be no criticism and the wild ideas should be encouraged and recorded without evaluation.
- ii. Emphasis should be placed on quantity of ideas and not the quality.
- iii. There is a need of equal participation of members.
- iv. It can be unfocused so teacher should know how to control discussion and facilitate issues.
- v. It works well in small group

4.2.6 Role play Method

Role play occurs when participants take on differentiated roles in a simulation. These may be highly prescribed, including biographical details, and even personality, attitudes and beliefs; or loosely indicated by an outline of the function or task. These techniques have already demonstrated their applicability to a wide range of learners, subjects and levels (University of Glasgow, 2004). It is a memorable and enjoyable learning method. To gain maximum benefits from this method, the selected cases should be as realistic as the situation allows. According to Sajjad (2010), ways of enhancing discussion method include:

- i. Before the role play, the teacher should brief participants about the roles they will play, give them time for preparation, confirm confidentiality of role play, and ask participants to behave naturally.
- ii. Teacher should select & brief observers about their roles.
- iii. During the role play, the teacher must keep quiet, listen & take notes, avoid cutting role play short, but give time warning if previously agreed.
- iv. The teacher should be prepared for some action if participants dry up and can intervene as a last resort.
- v. After the role play, the teacher thanks participants, ask for feedback from lead participants, take comments from observers, ask other participants to comment,
- vi. The teacher should use role names not those of participants, summarize, drawing out learning points, leaving the participants with positive comments and feelings.

5. CONCLUSION

As have been strongly argued by the relevant stakeholders that architecture education is expected to teach and foster creativity because design studio the students are supposed not merely to learn how to form space, how to shape places or how to fashion buildings according to a pre-existing pattern but also to understand the structural systems that will keep the building structurally stable. In support of this study lecturers have the responsibility to break this traditionalism, make the students think innovatively, have a fresh view on the built environment, be able to design a world even better than before and a world that possibly we cannot even imagine. The conflicts of modern times demand high levels of creativity from the architect, as creativity, with all its social and physical connotations, should be the guiding concept in the revision of architectural education.

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Table 1. Frequency and Percentages on Lecture Method

Item on lecture method	Percentage (%)				Mean Response Value (MRV)
	Strongly disagree	disagree	Agree	Strongly agree	
Helps create new ideas	7.41	22.22	46.91	23.46	2.86
Lecturers explains all points	11.11	35.80	44.44	8.64	2.49
Students give their input	13.58	13.58	65.43	7.41	2.85
Lecturers provides all knowledge related to topic	2.47	48.15	41.98	7.41	2.54
Time saving as teacher is supposed to finish lecture in time	1.23	14.81	69.14	14.81	2.98
Students are more involved and participate when lecturer ask questions	0.00	20.99	49.38	29.63	3.09
Lecturer provides notes	0.00	11.11	61.73	27.16	3.16
Lecturer is a role model for students	2.47	19.75	58.02	19.75	3.16
Enjoys lecture method	0.00	25.93	59.26	14.81	2.89
Lecturers create fear	3.70	40.74	39.51	16.05	2.69
Lecturer is experienced and has mastery of subject and can answer all questions by students	3.70	23.46	39.51	33.33	3.05
Takes note during lectures	6.17	20.99	44.44	28.40	2.98
Lecture materials easily understood	16.05	22.22	37.04	24.69	2.73
Lecturers make use of modern lecturing equipment	44.03	24.83	15.02	16.12	1.75

Table 2 Frequency and Percentages on Assignment Method

Item on assignment method	Percentage (%)				Mean Response Value (MRV)
	Strongly disagree	disagree	Agree	Strongly agree	
Lecturer gives adequate time before submission of answers	18.52	16.05	28.40	37.04	2.84
Task to engage in active learning	4.94	6.17	74.07	14.81	2.99
Lecturer provides solution to the whole class after students submission	0.00	13.58	66.67	19.75	3.06
Helps in-depth understanding	2.47	8.64	82.72	6.17	2.93
Within scope of taught topics	3.70	6.17	71.60	18.52	3.05

Table 3: Frequency and Percentages on Test/Quiz Method

Item on test/quiz method	Percentage (%)				Mean Response Value (MRV)
	Strongly disagree	disagree	Agree	Strongly agree	
Helps in-depth understanding	2.47	20.99	54.32	22.22	2.96
Entrench students participation	4.94	27.16	48.15	19.75	2.83
Learning is effective	1.23	22.22	61.73	14.81	2.90
Enjoys having test/quiz	1.23	16.05	67.90	14.81	2.96
Good for large class	7.41	24.69	53.09	14.81	2.75
Lecturer gives adequate time before submission of answers	7.41	23.46	49.38	19.75	2.81
Lecturer provides solution to the whole class after students submission	8.64	20.99	50.62	19.75	2.81

Table 4: Frequency and Percentages on Case Study Method

Item on case study method	Percentage (%)				Mean Response Value (MRV)
	Strongly disagree	disagree	Agree	Strongly agree	
Helps in-depth understanding	2.47	9.88	64.20	23.46	3.09
Frequently used by lecturer	1.23	28.40	59.26	11.11	2.80
Encourages creative thinking	0.00	14.81	66.67	18.52	3.04
Provokes research	1.23	22.22	70.37	6.17	2.81
More informative	2.47	11.11	70.37	16.05	3.00
Report always submitted	3.70	28.40	45.68	22.22	2.86
Lecturer gives adequate time before submission of findings	1.23	18.52	61.73	18.52	2.98
Cases study matches course objectives	0.00	19.75	64.20	16.05	2.96
Allows application of what was taught in lecture room	0.00	24.69	53.09	22.22	2.98
Better done in groups	4.94	14.81	44.44	35.80	3.11