



# **Effect of Peer Tutoring Instructional Method on Academic Achievement of Students in Biology and Building Technology Options in Rivers State University, Port Harcourt**

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## **ABSTRACT**

This study examined the effect of Peer Tutoring Instructional method on academic achievement of students in Biology and Building Technology options in Rivers State University, Port Harcourt. The study adopted the quasi-experimental research design. Two research questions were raised to guide the study. The total population of the study was 256 students of both Biology option of Science Education Department (SED) and Building Technology option of Vocational and Technology Education Department (VTE) of Rivers State University, Port Harcourt. The sample of the study included all 256 students. The researchers used two 20-item teacher-made test as instruments for the collection of data for the study, namely; Biology Achievement Test (BAT) and Building Technology Achievement Test (BuTAT). Both BAT and BuTAT were validated by experts from departments of SED and VTE in Rivers State University, Port Harcourt. The reliability of the instruments was determined using Kuder Richardson- 21 and estimated to be 0.79 for BAT, and 0.81 for BuTAT, respectively. Mean and standard deviation were employed to answer the research questions. Findings revealed that peer tutoring has greater effect on achievement of students of Building Technology than Biology students. Also, Peer Tutorial has more effect on male students of Building Technology than male students of Biology. Finally, Peer Tutorial does not have significant effect on gender when achievements of male and female students are compared in each option. It was therefore recommended that; Peer Tutorial teaching approach be adopted in teaching both Biology and Building Technology students for effective learning.

**Key words:** Peer Tutoring, Demonstration teaching method, Instructional Methods, Biology, Building Technology, Science Education, Technology and Vocational Education

## **Introduction**

The primary purpose of teaching at any level of education is to bring a fundamental change in the learner (Tebabal&Kahssay, 2011). To facilitate the process of knowledge transmission, teachers apply appropriate teaching methods that best suit specific objectives and learning outcomes. In the traditional approach, many teaching practitioners widely applied teacher-centered methods to impart knowledge to learners instead of student-centered methods. Until today, questions about the effectiveness of teaching methods on student learning have consistently raised considerable interest in the thematic field of educational research (Hightower, 2011). Quite remarkably, regular poor academic performance by the majority of students is fundamentally linked to application of ineffective teaching methods by teachers to impart knowledge to learners (Adunola, 2011). Substantial research on the effectiveness of teaching methods indicates that the quality of teaching is often reflected by the achievements of learners. According to Ayeni (2011), teaching is a process that involves bringing about desirable changes in learners so as to achieve specific outcomes. In order for the method used for teaching to be effective, Adunola (2011) maintains that teachers need to be conversant with numerous teaching strategies that take recognition of the magnitude of complexity of the concepts to be covered.

While many instructors are aware that different learning methods and techniques exist, some educators simply opt to utilize the lecture method and demonstration in implementing the curriculum in tertiary institutions, hoping that they will cover most student learning preferences along the way. According to Oranu (2013), the lecture method and demonstration method are content driven and certainly not learner-centred. These methods which are predominantly used in educational institutions for teaching are based on behavioural learning theories which emphasize knowledge transmission from the teacher to passive students and encourage rote memorization of fact (Boyle, Duffy and Dunleavy, 2013). In addition, behavioural learning theories are directed towards isolating the learner from social interaction and towards seeing education as a one-on-one relationship between the learner and the objective material being learned (Uwameiye and Aduwa-Ogiegbean, 2016).

Biology and Building Technology are academic programmes undertaken in our schools; secondary, Colleges of Education, Polytechnics and Universities. The increasing effects of technological changes in the world and globalization have informed the United Nations Educational, Social, and Cultural Organization (UNESCO) and the International Labour Organization (ILO, 2012) to recommend that Science and Technical and Vocational

Education system be geared towards lifelong learning. In line with this, Rojewski (2012) opined that to prepare students in a scientific and technologically advanced workplace requires educational institutions to, in addition to academic skill, inculcate a broad set of workplace skills which include to learn both technical and interpersonal/communication skills, higher order thinking skills such as decision-making and problem-solving as well as flexibility, creative thinking and ability to work in team which make the students adaptable to the present and future changes. A complete education of students in the contemporary workplace therefore must focus on developing skills that will enable students to be responsible and be effective problem solvers (Moore, 2018).

The conventional teaching method of instruction which is sometimes referred to as “one-way communication” method of instruction is widely used in schools. When this method is used, the teacher does most of the talking, and the students more often assume a passive role. To a large extent, the students might be afraid to ask questions and express their opinions. This situation is in contrast with modern teaching which requires less talk on the part of the teacher and more activities on the part of the students (Abdullahi, 2018). As such, the conventional teaching method has been criticized as faulty (Uwameiye and Aduwa-Ogiegbaen, 2016). The traditional approach emphasizes academic, intellectual and cognitive aspects of teaching Biology and Building Technology and neglects the human, social and affective dimensions of the disciplines within a rapidly changing society. The consequence of the use of the conventional teaching method in teaching science and technical subjects such as Biology and Building Technology in universities is that students are unable to retain their learning and apply it to new situation, as much as possible, (Rojewski, 2012). However, the construction industries due to technological development and globalization are in constant search for technological advancement that could improve their profit margin in less time with greater labour efficiency.

Since RPT consists of recurrent instructional processes applicable to various types of subject matter and usable by more than one teacher, it could be used for teaching Biology and Building Technology. It is a pattern of interaction between the tutor and the tutee, with the experience intended to lead to a change in learning outcomes. Interaction here refers to the verbal and non-verbal communication, which forms the basis of any teaching method (Uwameiye and Aduwa-Ogiegbaen, 2016). Though, literature abounds regarding the efficacy of PT (Adeola, 2014) and RPT (Ohiwerie, 2016; and Uwameiye and Aduwa-Ogiegbaen, 2016), these approaches to teaching do not seem to be popular among Building Technology educators in Nigerian universities. It becomes necessary to provide information and evidence on the effect of peer tutoring and reciprocal peer tutoring on the academic achievement of undergraduate students in Biology and Building Technology in Rivers State Universities.

The cognitive, psychological and social interdependence theories promote students’ interaction with their peers for mutual exchange of ideas, explanations, clarifications and justifications. Cooperative learning is an interactive process in a social setting that allows students to explore and work in groups, making meaning of tasks and setting out to solving problems that are perplexing to them. Students interact with themselves on the ground that with their peers, they are able to operate on equal footing. Also, they see that throughout the interaction, there is non-authoritarian exchange of ideas, freedom to ask questions and express opinions. The interaction among peers promotes learning outcomes (Reiness, 2018), facilitate higher thinking skills, promote social interaction and experiences and context that make the students willing and able to learn. Reiness further identified the following three distinct areas of social interaction among peers: Cross-Age Tutoring (CAT), Peer Tutoring (PT), and Reciprocal Peer Tutoring (RPT).

Peer tutoring (PT) is a structured technique in which students of a level of performance work together in small groups (two, three, four, or five, or class wide – a peer tutor to the whole class) towards a common goal. PT is a personalized system of instruction which is learner-oriented rather than teacher-oriented. It emphasizes clear goals, active student participation in the learning process, feedback and evaluation, and individual pacing (Adeola, 2014). Students work together to learn and are responsible for one another’s learning as well as their own. In this approach a student (tutor) trains another learner in skills and subject matter that the tutor has mastered. The tutor provides individualized instructions to other students for skill remediation or supplemental instruction. PT has the incentive to cooperate which when available, students exhibit cooperative task-oriented behaviours in learning groups. There is also the potential for cultivating and grooming the discipline of self-directed study in an academic field as well as learners’ level of cognitive development. Adeola, (2014) & Onabanjo, (2010) revealed that PT could be a simple instructional technique that shows great promise for meeting the complex academic and social needs of the students today. Peer interaction can have a powerful influence on academic motivation and achievement (Adeola, 2014). PT could be an important educational practice and if properly planned will be of immense benefit to the Nigerian educational system (Mkpa, 2019).

Reciprocal Peer Tutoring (RPT), on the other hand is an individualized attention to a learner by a person of similar status with respect to age and educational experience, who serves as the tutor. RPT is a collaborative technique of instruction where students of the same class and age bracket alternate between the role of student (tutees) and teachers (tutors) and may follow a structural format to help team members make academic progress. Students alternate roles while in their groups or pairs. RPT enables each member in a group to participate in the group as a tutor and tutee. In RPT, students gain from the preparation and instruction in which the tutors engage in, and also from the instructions that the tutees receive. RPT has a structured format where students teach, monitor, evaluate and encourage each other. Students are part of the educational process and are able to prepare instructional materials and receive feedback from peers. The alternating structure is designed to increase student choice and participation in the management of their own group interdependent teaching.

The term Instructional Methods is sometimes referred to differently by researchers though they all mean the same thing. Other terms include Teaching Methods, Teaching Strategies, Instructional Strategies or Training Methods. Instructional methods consist of principles and methods used by [teachers](#) to enhance and relate the training to learners. It is defined by the process that you use to instruct people on a particular topic (Ukoha and Eneogwe, 2016). Each instructional method has its use. Instructional methods are kinds of instructional ways or activities used to guide the facilitation of learning in each phase of the instructional process.

Various scholars have different spectrums of classifying the instructional strategies or methods. For instance, Ekwensi, (2016) suggest four different models of instructional strategies as Didactic (Direct verbal teaching in the form of lecture presentation), Modeling (Direct visual teaching in the form of demonstration and practice), Managerial (Indirect teaching that promoted individual and group projects) and Dialogic (Indirect teaching that employs the Socratic technique of dialogue). Petrina (2017) in a different lens though in a similar spirit, classify the methods/strategies into three, namely Transmissive (Direct instruction in the form of lecture and demonstration), Transactive (Indirect instruction through dialogue) and Transformative (A blend of both direct and indirect teaching). O'Bannon (2012) rather classifies the instructional methods and strategies into two main groups. These are the Teacher-centred approaches and the Learner centred approaches. The teacher-centred approaches heighten the teacher's role over the learners while the learner-centred approaches intensify the learners' activities while the teacher acts as a guide. The instructional methods and strategies include presentation/lecture, demonstration, discussion, drill and practice, tutorial, cooperative learning group, Gaming, simulation, discovery and problem solving.

Fehintola (2014) opined that students gain more knowledge when Peer tutoring strategy is employed. He stressed that, the pairing of higher- and lower-achieving students is intended so students gain knowledge from each other practice and reinforcement (students are still within the same skill level, there is not a huge discrepancy between ability levels). Teachers must carefully describe how the PT methods are done and how they relate to a particular lesson; they must monitor the roles taken on by each student, and interject when instruction is needed. Moreso, Jenkins, (2017) asserted that Students are taught to develop their skills through specific techniques in peer tutoring. They are encouraged to review and ask questions during tutoring sessions based on the teacher's instruction. Students generate questions and draw conclusions through reciprocal interaction. The reinforcement they receive while working in groups motivates learning. These sessions create a classroom where student pairs can work on different levels and on different types of problems or at varying reading levels. Teachers can meet the individual needs of students while keeping the entire class engaged.

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### Statement of Problem

The abysmal academic performance of students in Biology and Building Technology constitutes a great source of worry and serious concern as well as confusion to parents, school managers, policy makers and governments at various levels responsible for the education of students in Nigeria. The current methods of teaching in Nigerian educational institutions are based on the behavioural learning theories which are content driven, not learner-centred, and do not sufficiently give students the opportunities to participate in the classroom instruction. Students taught with these methods do not sufficiently retain their learning and apply it to new situations. The methods employed by educators seem inadequate for equipping students studying Biology and Building Technology with the workplace skills, knowledge and attitude required for work in science-related and construction industries which are fast changing with advancement in technology.

Reasons for the poor performance have been partly attributed to the wrong teaching approach (conventional teaching method) adopted by the teachers. The inadequacy of the method is partly responsible for the inability of the students to secure employment in industries or be self-employed. As a result, many of the students are found roaming the streets without jobs partly because their training was inadequate to face the challenges in the world of work. The high rate of unemployment of graduates defeats the very fundamental objective of education for self-reliance as spelt out in the national policy on education.

Apparently, the traditional approach based on the behavioural theories tends to overlook the human, social, cultural and psychological or affective problems of the students; and does not emphasize the development of workplace basic skills essential for students to be employable in the 21st century workplace. This work provided evidence-based research on the effect of an innovative teaching strategy on students' academic achievement in both Biology and Building Technology. This becomes necessary in order to mitigate the problem of students' poor performance and to meet societal and industrial needs. In the light of the above, the main thrust of this research was to examine the effect of Peer tutoring on students' achievement in Biology and Building Technology in Rivers State Universities.

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### Purpose of the Study

The main purpose of this study was to examine the effect of Peer Tutoring teaching strategy on academic achievement of students in Biology and Building Technology options in Rivers State University, Port Harcourt. Specifically, the study sought to;

1. Examine the effect of Peer Tutoring (PT) on academic achievement of students in Biology and Building Technology in Rivers State University, Port Harcourt.
2. Examine the effect of Peer Tutoring on the academic achievement of male and female students in Biology and Building Technology in Rivers State University, Port Harcourt.

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### Research Questions

1. What is the effect of Peer Tutoring (PT) on academic achievement of students in Biology and Building Technology in Rivers State University, Port Harcourt?

2. What is the effect of Peer Tutoring on the academic achievement of male and female students in Biology and Building Technology in Rivers State University, Port Harcourt?

## Methodology

The research design for this study was quasi-experimental research design. The pretest-posttest design.

The area of study was Rivers State University, Port Harcourt. The study population was all 229 students in Biology option in department of Science Education and 27 of Building option in department of Vocational and Technology Education, totaling 256. The entire population was used as sample because it was of manageable size. Hence, the sample strategy used was census and sample size of 256. Two instruments were used for the research, namely; Biology Achievement Test (BAT) and Building Technology Achievement Test (BuTAT). Both instruments, which were teacher-made consisted of 20-item and used for the collection of data for the study. BAT and BuTAT were validated by experts from departments of SED and VTE in Rivers State University, Port Harcourt. The reliability of the instruments was determined using Kuder Richardson- 21 and estimated to be 0.79 for BAT, and 0.81 for BuTAT, respectively. Mean and standard deviation were employed to answer the research questions.

The subjects were categorized into 4 distinct groups; experimental group 1, experimental group 2, control group 1, and control group 2. Experimental group 1 consisted of 134 students of Biology option; experimental group 2 was made up of 11 students of Building Technology option; control group 1 composed of 95 students of Biology option; while control group 2 consisted of 16 students of Building Technology option. They were all non-randomized groups. Intact classes were used. Experimental groups 1 and 2 were taught using Peer Tutoring while the control groups 1 and 2 were taught using Demonstration method. Both experimental and control groups were given pretest. After pretest, the experimental groups undergone treatment using peer tutoring method before given post-test, while the control groups were taught using discussion method and later given post-test.

## Result Presentation and Discussion

**Research Question 1:** What is the effect of Peer Tutoring on academic achievement of students in Biology and Building Technology in Rivers State University, Port Harcourt?

**Table 1: Mean effect of Peer Tutoring on academic achievement of students**

**in Biology and Building Technology in Rivers State University,**

**Port Harcourt**

Groups	N	Pretest		Post-test		Mean Gain
		Mean X	SD	Mean X	SD	
Experimental Group 1 (Bio)	134	7.16	1.78	14.10	2.16	<b>6.94</b>
Experimental Group 2 (Build)	11	6.82	1.22	14.82	2.34	<b>8.00</b>
Control Group 1 (Bio)	95	7.22	1.80	10.09	2.02	<b>2.87</b>
Control Group 2 (Build)	16	6.94	1.27	9.06	1.94	<b>2.12</b>
<b>TOTAL</b>	<b>256</b>	<b>28.14</b>	<b>6.07</b>	<b>48.07</b>	<b>8.46</b>	<b>19.93</b>

**Source: Field Survey (2022)**

Result on table 1 showed that the mean pretest score of experimental group 1 (Biology students) is 7.16 and standard deviation of 1.78, while the mean post-test score is 14.10 and standard deviation of 2.16. It showed a mean gain of 6.94. For experimental group 2 (Building technology students), a pretest score of 6.82 and standard deviation of 1.22, with a post-test score of 14.82 and standard deviation of 2.34. This produced a mean gain of 8.00. Comparing the two experimental groups (Biology and Building technology), it becomes clear to say that, Peer tutoring was more effective for Building technology students (mean gain of 8.00) than Biology students (mean gain of 6.94). On the other hand, looking at the experimental against the control groups, it was seen that for Biology students there was a mean gain of 6.94 for experimental and 2.87 for control, with a mean difference of 4.07. Conversely, for Building students, experimental group has a mean gain of 8.00 against 2.12 in control group, producing a mean difference of 5.88. Therefore, Peer tutoring has greater effect on Building Technology students than Biology students.

The finding supported the position of Fehintola (2014) who opined that students gain more knowledge when Peer tutoring strategy is employed. He stressed that, the pairing of higher- and lower-achieving students is intended so students gain knowledge from each other practice and reinforcement (students are still within the same skill level, there is not a huge discrepancy between ability levels). Teachers must carefully describe how the PT methods are done and how they relate to a particular lesson; they must monitor the roles taken on by each student, and interject when instruction is needed. Moreso, Jenkins, (2017) asserted that Students are taught to develop their skills through specific techniques in peer tutoring. They are encouraged to review and ask questions during tutoring sessions based on the teacher's instruction. Students generate questions and draw conclusions through reciprocal interaction. The reinforcement they receive while working in groups motivates learning. These sessions create a classroom where student pairs can work on different levels and on different types of problems or at varying reading levels. Teachers can meet the individual needs of students while keeping the entire class engaged.

**Research Question 2:** What is the effect of Peer Tutoring on the academic achievement of male and female students in Biology and Building Technology in Rivers State University, Port Harcourt?

**Table 2: Mean effect of Peer Tutoring on academic achievement of male and female students in Biology and Building Technology in Rivers State University,**

**Port Harcourt**

Groups	Gender	N	Pretest		Post-test		Mean Gain
			Mean x	SD	Mean x	SD	
<b>Exp 1 Bio</b>	Male	63	7.06	2.18	13.81	2.48	<b>6.75</b>
	Female	71	7.25	2.22	15.49	2.53	<b>8.24</b>
<b>Exp 2 Build</b>	Male	7	6.71	1.94	15.00	1.98	<b>8.29</b>
	Female	4	7.00	2.37	14.50	2.22	<b>7.50</b>
<b>Control 1 Bio</b>	Male	41	7.20	2.07	10.06	2.53	<b>2.86</b>
	Female	54	7.24	2.07	10.15	2.09	<b>2.91</b>
<b>Control 2 Build</b>	Male	11	6.55	1.89	8.82	2.03	<b>2.27</b>
	Female	5	7.80	2.25	9.60	1.80	<b>1.80</b>
<b>TOTAL</b>		<b>256</b>	<b>56.81</b>		<b>97.43</b>		<b>40.62</b>

**Source: Field Survey (2022)**

Result on table 2 above for research question two showed that; in the experimental group 1 (Biology) the male students have a pretest of 7.06 and posttest of 13.81 with mean gain of 6.75, while the female students have a pretest of 7.21, posttest of 15.49 and mean gain of 8.24. This revealed that female students performed better than their male counterparts, when taught with Peer tutoring teaching strategy. Further, in experimental group 2 (Building technology students), the male students have a pretest of 6.71, posttest of 15.00, and mean gain of 8.29; while the females have pretest of 7.00, posttest of 14.50 and mean gain of 7.50. Here, the male students outperformed the females. Comparing the two experimental groups, the male in experimental group 2 (Building tech) with mean gain of 8.29 performed better than males in group 1 (Biology) with mean gain of 6.75; while the female in group 1 (Biology) performed better (with mean gain of 8.24) than group 2 female students of mean gain of 7.50. In summary therefore, Peer tutoring method of teaching was more effective for male students in group 2 than their colleagues in group 1. Also, the teaching strategy was more effective for female students in group 1 than their counterparts in group 2.

### Major Findings of the study

The major findings of the study included the following:

- Peer tutoring teaching strategy was more effective in students of Building Technology than Biology students of Rivers State University, Port Harcourt.
- Male students of Building technology performed better than male students of Biology when taught with Peer tutoring method of teaching. Conversely, female Biology students outperformed their female counterparts in Building technology when taught with Peer tutoring method of teaching.
- The difference in the mean achievement of students taught with Peer tutoring method was negligible in terms of gender.

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## Conclusion

Based on the findings of this study, the following conclusions were made:

1. Peer tutoring teaching method is more effective for students of Building Technology option than students of Biology option.
2. Peer tutoring teaching strategy is more effective than Demonstration method when used for both Building Technology and Biology students.
3. Male students of Building technology outshined their male counterparts of Biology when taught with Peer tutoring method of teaching. Conversely, female Biology students outperformed their female colleagues in Building technology when taught with Peer tutoring method of teaching.

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## Recommendations

Based on the findings of this study the following recommendations were made:

- 1) Peer tutoring teaching method should be adopted in the teaching of both Building technology and Biology students.
- 2) Teachers should not discriminate on account of gender when using Peer tutoring for the teaching of both Building and Biology students.

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