

BEHAVIOURAL AND SKILL OUTCOME AMONG TELECOMMUNICATION STUDENTS ENGAGED IN PROBLEM-BASED LABORATORY EXPERIENCE IN POLYTECHNICS IN NORTH CENTRAL STATES OF NIGERIA

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Abstract

The design of the study was an interrupted time series analysis is a quasi-experimental design intervention Time-Series Designs. The area of this study is the North Central Zone of Nigeria. The population was 106) telecommunications students in 12 polytechnics. The sample for this study will comprise 282. The validated instrument for data collection. The instrument is titled “Rubrics for Assessing Behavioral and Skills Outcomes of Telecommunication Students Engaged in Problem-Based Laboratory Experience (RABSOTSEPLE). The rubric is divided into six clusters. Cluster I assessed the communication skills of telecommunication students. Cluster II assessed the interpersonal skills of telecommunication students. Cluster III assessed the skill outcome of telecommunication student. Then cluster IV assessed the self-confidence telecommunication students. To ensure the reliability of the instrument, the instrument was trial-tested on 20 telecommunication students engaged in problem-based laboratory experience in Federal Polytechnic Bida. The researcher, together with 12 research assistants assess students during problem-based laboratory exercises. t-test statistics for significant level. The findings show that there was improvement in interpersonal skills; there was improvement in self-confidence; Recommendations Technical teachers should use Behavioral in problem-based laboratory experience; Teachers of telecommunication should prepare their lessons in line with managerial skills outcomes guidelines, such a way that the students are given ample opportunity to interact freely with them. Workshops, seminars and conferences should be organized to enlighten technical teachers and improve their knowledge and skills outcomes on the use of behavioural skills to utilize them for improving students’ problem-based learning in behavioural and skills outcomes

Introduction

Telecommunication has transformed the world. It is the wheel that is moving technological development in the world today. According to Raman (2015), telecommunication involves the exchange of information between two communication entities using technology. It is the transmission of signs, signals, sounds, words, writing, and messages via signals, wire, radio and optics. According to When (2011), it is the science of communicating over a long-distance using telephone or radio technology. This means that telecommunication has to do with the exchange of information over a long distance. It makes use of other media like radio, optics and wires. To achieve communication through these media demands a great deal of skill, knowledge and attitude. These media are communication systems and as such have input, process and output signals with complex circuitry. Communication systems are made up of fragile sensitive components or devices as such are of developing fault. Hence, reading facts in element of communication system demands adequate skills and proven attitude of polytechnic students.

The polytechnic, as one of the institutions, is primarily saddled with the responsibility of producing technicians. A Polytechnic, according to Tumba and Michika (2014), is a tertiary educational institution whose statutory function is primarily to train middle-level manpower for the nation. Polytechnics are established to continue with, expand and pursue the objectives of Technical and Vocational Education and Training in Nigeria (Omokungbe, 2018). The polytechnic education is charged with the primary responsibility of producing the technical manpower needed for industrial growth in Nigeria. This responsibility of the polytechnics is also performed by the Universities of Technology in Nigeria.

In specific terms, the primary purpose of polytechnic education in Nigeria is to provide technical learning that will certainly assist the nation in meeting its needs for industrial growth. A major difference between the polytechnic education and other forms of tertiary education in Nigeria is the emphasis it places on practical-based learning, with work-attachment as part of its curriculum (Tayo, 2014). The curriculum design and instructional delivery are tailored as to enable students to have on-the-job work experience. The focus is on students' future careers. The aim here is to ensure that students develop self-belief and critical reasoning and thinking, which are significant to the growth and development of society (Addison, 2012). Hence, of the teaching methods that can guarantee this type of learning that involves hands-on practice is problem-based learning.

Problem-based learning involves learning new knowledge. According to Overton (2010), problem-based learning involves problems that are meant for the curriculum objectives. They have to be real and engaging. They also need to place the group in a professional role. As scientists, problem-based learning requires students to develop a problem-solving strategy that require the student to acquire new knowledge and also require the students to make judgments, approximations and deal with omitted or excess information. According to Pepper (2009), Problem-based learning (PBL) is a teaching and learning strategy which is used to engage students in deep learning. It is a strategy used to align courses work with the real-life professional work that students are expected to engage in on graduation. To McKenzie and Brown (2017), PBL is a teaching method used to develop skills like team working, listening and self-directed learning. It allows the use of research and reasoning to progress and complete the task in a professionalized way. PBL is an instructional learner-centered strategy that strengthens learners to carry-out research, fuse theory and practice, and apply knowledge and skills to develop a real solution to problems (Sindelar, 2010). Since this type of learning involves the blending of theory and practice and application of knowledge to real life problem, it usually requires laboratory experience, hands-on experience, critical thinking among others.

Problem base laboratory experience entails the conduct of research and to carry-out laboratory work in small groups to develop necessary skills in the students for lifelong experiences. From Barrett (2010), problem-based laboratory experience (PBLE) can be viewed as a student-centered teaching strategy in which students learn about a particular content or tasks by solving open-ended problems found in trigger material. It also involves learners working in small groups and focuses on the learner's reflection and reasoning to construct their own learning experiences (Peters & Amador, 2006; Azer, 2011). According to Schmidt, Henk, Rotgans and Yew (2011), problem-based laboratory experience can be viewed as the type of learning based on identified issues within a scenario in the laboratory to increase knowledge and understanding. PBLE does not focus on problem solving with a defined solution, but it allows for the development of desirable skills, attributes and experiences. This includes knowledge acquisition, skills outcomes, enhanced communication and interpersonal skills that promote further learning and behavioural outcomes among group members.

Behaviour could be seen to mean overt attitude. They are dispositions that are explicit and can easily be seen in an individual. According to Ossorio (2006), behaviours are observable and measurable actions of individuals or organisms. To Lazzeri (2014), behaviour

is a range of observable physical and emotional actions that people engage in; biologically, socially, intellectually, and so on and are influenced by their culture, attitudes, emotions, among other factors. The product of such behaviour is known as behavioral outcome. These are observable and desirable changes in an individual's actions (Bergner, 2011). The expression of some of these behavioral outcomes leads individuals to acquire and perfect certain skills.

Skills can simply be seen as the ability to do something well. It is a kind of ability to perform a task. Hence, behavioral skill outcomes are observable and desirable physical and emotional actions that lead an individual to perform a task very well. Gupta (2007) defined skill outcomes as competencies, values, motivations and beliefs people need to be successful in a job or task. That means that skill outcomes are knowledge required for the performance of tasks that are of importance to the student. Rothwell (2012) explains that there are core skills outcomes required for task accomplishment. Kruger (2006) stated that non-technical skills are considered functional or basic skills used to apply to tasks and to solve new problems which may go beyond one's training to include past experiences that enhance problem solving. These forms of skills include communication, interpersonal and information processing skills.

Furthermore, technical skills are skills possessed as a result of some form of training in a specific area. According to Medina (2010), technical skills are abilities, expertise or competencies necessary for executing specific tasks. Mohd and Saifuddin (2009) stated that technical skills are considered the ability to perform tasks or activities very well or in a competent manner and also to monitor it in an independent and critical manner. Technical skills can be acquired through formal means. Accordingly, Medina (2010) explained that the common way is through academic training and also by attending courses and seminars organized to obtain such skills. All these skills could therefore be acquired by telecommunication students engaged in problem-based laboratory experience. Experiences gained from this exposure can be employed in resolving specific problems or challenges practically or in theoretical terms. According to Lazzeri (2014), behavioural skills include; social skills, emotional skills, intellectual or cognitive skills, communication skills, interpersonal skills and self-confidence for this study, the behavioural skill of interest is the communication skill.

Communication is a means of exchanging information between one person and another. Good communication skills are highly required in all contexts of life. Schultz (2008) defined communication skills as the ability to communicate in a socially acceptable way,

which involves the speaker's interaction with others, the audience's perception about the speaker in terms of vocal presentation, message control, command of language, physical appearance and so on. Accordingly, Pratt and Richards (2014) asserted that written communication, verbal communication, and active listening are skills that may enhance academic performance. Osborn and Pearson (2014) supported this assertion by noting that oral and written communication skills are the prerequisites for students' academic, personal, and professional success.

Such a student needs interpersonal skills. These will further enhance classroom interaction and sociability. Students' interpersonal skills involve the interrelationship among students in the class. This is quite an important skill required in a problem-solving classroom. To Weiner (2007), interpersonal skills are affective attributes that enable an individual to interact with other people. These skills, according to Irma (2010), concern how people express their confidence, ability to listen, and understand, solve problems, make decisions, manage self and develop their emotional intelligence, which implies knowing oneself in social interactions and being willing to share ideas and feelings with others. These skills determine the ability to recognize and connect with others. According to Wood (2009), people, especially telecommunication students, need to have effective interpersonal skills to enable them to understand themselves and others' behaviours, cope with circumstances, and control any situation(s) they find themselves in. Possession of interpersonal skills will build self-confidence in the students.

Self-confidence is the degree of confidence students possess in the execution of certain task(s). Students' self-confidence is the degree of confidence students have in their ability to carry out a specific task. Tunçel (2015) defined self-confidence as an individual's self-assessment and self-esteem. This implies that self-esteem and self-efficacy in combination constitute what is referred to as self-confidence. Self-confidence, according to Al-Hebaish, (2012), is perceived as an individual's characteristic which enables the individual to have positive or realistic views of him/herself or the situations that he/she is in. Self-confidence explains an individual's expectation of his or her ability to achieve a goal in a given situation and is a very influential factor in ensuring that a person's potential is realized. Individuals with high self-confidence may have a realistic view of themselves and their capabilities, which makes them persistent in their endeavours. Al-Hebaish (2012) stated that there was a positive, significant correlation between general self-confidence and academic achievement. This may also be the case concerning telecommunication students' behavioural and skills outcomes in

problem-based laboratory experience. In other words, self-confidence may facilitate or debilitate telecommunication students' skills outcomes in problem-based laboratory experience, which this present study seeks to ascertain. Therefore, telecommunication students who possess high self-confidence are likely to exhibit high skills outcomes in problem-based laboratory experience due to the positive belief differences might affect the acquisition of the skills abilities in gender.

Gender differences might affect the acquisition of the skills. Males and females tend to learn and acquire skills differently. Gender in this can be viewed as the role that male and female students play in the acquisition of skills. It differentiates the way they interact and behave in group settings. According to Okeke (2003), the study of gender is not just a mere identification of male and female sexes. Gender concerns the analysis of the relationship of males and females, including the division of labour, tasks, access to resources, among other societal considerations. Mlambo (2011) perceived gender as a cultural construct that distinguishes the roles, behaviour, mental and emotional characteristics between males and females as developed by a society. This means that gender differences are defined by society based on its norms and values. This societal definition prescript activity for male and female students, which, they in turn bring to school. This, however, might likely affect their problem-solving laboratory experience. However, a study by Akiri and Ugborugbo (2008) reported that there was a significant relationship between gender and students' performance in a chemistry laboratory. Also, Olagunju and Abiona (2008) revealed that male students were more effective in science laboratory activities than their female counterparts, while Khurshid and Zahur (2013) discovered that females are more careful in laboratory activities than males.

Problem-based learning is been perceived to be a student-centered learning. Students involved in this type of learning acquire skills that could enhance the transfer of such skills to the outside world. Such skills could be obtained by telecommunication students involved in problem-based laboratory experience. Such experience could be provided in a polytechnic education. The institutions are saddled with the responsibility to produce trained technical manpower for the nation. In addition, studies on problem-based learning have stated that it has a series of benefits to the students and the society (Tunçel 2015). Gender differences may be obtainable among telecommunication students engaged in problem-based laboratory experience. Hence, the present study intends to investigate behavioural and skills outcomes among telecommunication students engaged in problem-based laboratory experience in polytechnics in the North Central States of Nigeria.

Statement of the Problem

Over the years, education aims to produce trained and qualified manpower relevant to the workplace. This was one of the aims of establishing the polytechnic and other technology-driven institutions. It was the hope of the National Policy of Education that these institutions would meet the target set for the students. As time passed, people have noticed that telecommunication graduates and others produced do not possess the needed skills for the workplace. This prompted educators and researchers to find solutions to the problems.

Most of the researchers blamed the trend on the teacher's use of traditional teaching techniques. They argue that these techniques do not engage students sufficiently in hands-on activities. This prompted a paradigm shift from those techniques to other techniques, including the problem-based learning. The problem-based learning is said to be efficient in laboratory experience. Researchers, hence, have noted that the problem-based laboratory experience can be used to teach students adequately to possess the needed work skills. Some of those skills stated by the researcher include, communication skills, interpersonal skills, and self-confidence skills. The literature noted that the acquisition of these skills will lead to positive behavioral and skills outcomes. However, many of such studies were conducted outside Nigeria. These assertions call for verification using the Nigerian setting.

Researches have also focused on how male and female students acquire and use such skills. Male and female students interact and learn differently under the same conditions. Due to reasons, male and female students' behavioral, skills and cognitive outcomes differ. Results in this regard have been mixed. Due to the mixed nature of results of such studies on gender and also the fact that these assertions made by these researchers leave more to be verified in the Nigerian setting, there is a gap in the literature necessitating the present study. Hence, the problem of this study is to management skills outcome among telecommunication students engaged in problem-based laboratory experience in polytechnics in north central states of Nigeria

Purpose of the Study

The general purpose of the study is to investigate behavioral and skills outcome among telecommunication students engaged in problem-based laboratory experience in polytechnics in the north central states of Nigeria. Specifically, the study determines the:

1. extent of communication skills possessed by telecommunication students engaged in problem-based laboratory experience.

2. extent of interpersonal skills possessed by telecommunication students engaged in problem-based in laboratory experience.
3. extent of self-confidence skills possessed by telecommunication students engaged in problem-based laboratory experience.

Research Questions

The following research questions guided the study:

1. What is the extent of communication skills possessed by telecommunication students engaged in problem-based laboratory experience?
2. What is the extent of interpersonal skills possessed by telecommunication students engaged in problem-based laboratory experience?
3. What is the extent of self-confidence skills possessed by telecommunication students engaged in problem-based laboratory experience?

Hypotheses

The following hypotheses are formulated to guide the study and will be tested at .05 level of significance.

H₀₁: There will be no significant difference between the communication skills of male and female telecommunication students engaged in a problem-based laboratory experience.

H₀₂: There will be no significant difference between the interpersonal skills of male and female telecommunication students engaged in a problem-based laboratory experience.

H₀₃: There will be no significant difference between the self-confidence skills of male and female telecommunication students engaged in a problem-based laboratory experience.

Methodology

The design of the study was an interrupted time series analysis is a quasi-experimental design intervention Time-Series Designs. The area of this study is the North Central Zone of Nigeria. The population was 106 telecommunications students in 12 polytechnics. The sample for this study will comprise 282. The validated instrument for data collection. The instrument is titled “Rubrics for Assessing Behavioral and Skills Outcomes of Telecommunication Students Engaged in Problem-Based Laboratory Experience (RABSOTSEPLE). The rubric is

divided into six clusters. Cluster I assessed the communication skills of telecommunication students. Cluster II assessed the interpersonal skills of telecommunication students. Cluster III assessed the skill outcome of telecommunication student. Then cluster IV assessed the self-confidence telecommunication students. To ensure the reliability of the instrument, the instrument was trial-tested on 20 telecommunication students engaged in problem-based laboratory experience in Federal Polytechnic Bida. The researcher, together with 12 research assistants assess students during problem-based laboratory exercises. t-test statistics for significant level

Result

Research Question 1:

Is there a change in communication skills possessed by telecommunication students from Time 1 (pre-intervention) to Time 2 (post-intervention)?

Table 1: Mean and Standard Deviation of Time 1 and Time 2 scores of communication skills possessed by telecommunication students from Time 1 (pre-intervention) to Time 2 (post-intervention)?

| | N | Time 1 | | Time 2 | | Mean gain |
|--------------------|-----|--------|------|--------|------|-----------|
| | | Mean | SD | Mean | SD | |
| Mean Scores | 275 | 5.28 | 1.48 | 13.46 | 2.42 | 8.18 |

The data presented in Table 1 show that Time 1 (pre-intervention) had a Mean score of 5.28 and Standard Deviation of 1.48 in the pre-intervention and Time 2 had Mean score of 13.46 and Standard Deviation of 2.42 in the post-intervention making a Time 1 and Time 2 Mean gain of 8.18. therefore, there was improvement in communication skills possessed by telecommunication students from Time 1 (pre-intervention) to Time 2 (post-intervention)?

Research Question 2

Is there a change in interpersonal skills possessed by telecommunication students from Time 1 (pre-intervention) to Time 2 (post-intervention)?

Data on this research Question is analyzed and presented in table 2

Table 2: Mean and Standard Deviation of Time 1 and Time 2 scores of interpersonal skills possessed by telecommunication students from Time 1 (pre-intervention) to Time 2 (post-intervention)?

| | N | Time 1 | Time 2 | Mean gain |
|--|---|--------|--------|-----------|
|--|---|--------|--------|-----------|

| | | Mean | SD | Mean | SD | |
|--------------------|-----|-------------|-----------|-------------|-----------|------|
| Mean Scores | 275 | 5.80 | 1.79 | 12.33 | 2.59 | 6.53 |

The data presented in Table 2 show that Time 1 (pre-intervention) had a Mean score of 5.80 and Standard Deviation of 1.79 in the pre-intervention and Time 2 had Mean score of 12.33 and Standard Deviation of 2.59 in the post-intervention making a Time 1 and Time 2 Mean gain of 6.53. Therefore, there was improvement in interpersonal skills possessed by telecommunication students from Time 1 (pre-intervention) to Time 2 (post-intervention)?

Research Question 3

Is there a change in self-confidence skills possessed by telecommunication students from Time 1 (pre-intervention) to Time 2 (post-intervention)?

Data on this research Question is analyzed and presented in table 3

Table 3: Mean and Standard Deviation of Time 1 and Time 2 scores of self-confidence skills possessed by telecommunication students from Time 1 (pre-intervention) to Time 2 (post-intervention)?

| | N | Time 1 | | Time 2 | | Mean gain |
|--------------------|----------|---------------|-----------|---------------|-----------|------------------|
| | | Mean | SD | Mean | SD | |
| Mean Scores | 275 | 7.95 | 1.40 | 19.60 | 3.28 | 11.95 |

The data presented in Table 3 show that Time 1 (pre-intervention) had a Mean score of 7.95 and Standard Deviation of 1.40 in the pre-intervention and Time 2 had Mean score of 19.60 and Standard Deviation of 3.28 in the post-intervention making a Time 1 and Time 2 Mean gain of 11.92. Therefore, there was improvement in self-confidence skills possessed by telecommunication students from Time 1 (pre-intervention) to Time 2 (post-intervention)?

Testing of Hypotheses

Hypothesis 1

HO₁: There is no significant change in the communication skills possessed by male and female telecommunication students engaged in problem-based laboratory experience.

Summary of t-test for hypothesis 1 are presented in Table 4.

Table 4: Summary of analysis of variance or test significant difference between mean Effect of Time 1 (pre-intervention) to Time 2 (post-intervention) in the communication skills possessed by male and female telecommunication students engaged in problem-based laboratory experience

| SEX | N | Mean | SD | T | df | Significance |
|--------|-----|--------|-------|--------|-----|--------------|
| Male | 196 | 13.306 | 2.531 | -1.645 | 273 | .101 |
| Female | 79 | 13.835 | 2.097 | | | |

The data presented in Table 4 show the mean calculated value or the effect of instructions on male and female telecommunication students engaged in problem-based laboratory experience. The mean calculated value of 12.04 at $t = -1.25$ with significant value of 0.21 which is above the 0.05. The null hypothesis is accepted at 0.05 level of significance. This implies that there is no significant difference between the gender mean scores of changes in the communication skills possessed by male and female telecommunication students engaged in problem-based laboratory experience.

Hypothesis 2

HO₂: There is no significant change in the interpersonal skills possessed by male and female telecommunication students engaged in problem-based laboratory experience.

Summary of t-test for hypothesis 2 are presented in Table 5.

Table 5: Summary of analysis of variance or test significant difference between mean Effect of Time 1 (pre-intervention) to Time 2 (post-intervention) in the interpersonal skills possessed by male and female telecommunication students engaged in problem-based laboratory experience.

| SEX | N | Mean | SD | T | Df | Significance |
|--------|-----|-------|------|-------|-----|--------------|
| Male | 196 | 12.32 | 2.50 | -.147 | 273 | 0.88 |
| Female | 79 | 12.37 | 2.82 | | | |

The data presented in Table 5 show the mean calculated value or the effect of instructions on male and female telecommunication students engaged in problem-based laboratory experience. The mean calculated value of 12.32 at $t = -1.47$ with significant value of 0.88 which is above the 0.05. The null hypothesis is accepted at 0.05 level of significance. This implies that there is no significant difference between the gender mean scores of changes

in the in the interpersonal skills possessed by male and female telecommunication students engaged in problem-based laboratory experience.

Hypothesis 3

HO₃: There is no significant change in the self-confidence skills possessed by male and female telecommunication students engaged in problem-based laboratory experience.

Summary of t-test for hypothesis 3 are presented in Table 6.

Table 6: Summary of analysis of variance or test significant difference between mean Effect of Time 1 (pre-intervention) to Time 2 (post-intervention) in the self-confidence skills possessed by male and female telecommunication students engaged in problem-based laboratory experience.

| SEX | N | Mean | SD | T | Df | Significance |
|--------|-----|-------|------|-------|-----|--------------|
| Male | 196 | 19.39 | 3.35 | -1.68 | 273 | 0.09 |
| Female | 79 | 20.13 | 3.08 | | | |

The data presented in Table 6 show the mean calculated value or the effect of instructions on male and female telecommunication students engaged in problem-based laboratory experience. The mean calculated value of 19.39 at t -1.68 with significant value of 0.09 which is above the 0.05. The null hypothesis is accepted at 0.05 level of significance. This implies that there is no significant difference between the gender mean scores of changes in the self-confidence skills possessed by male and female telecommunication students engaged in problem-based laboratory experience

Findings

1. There was improvement in communication skills
2. There was improvement in interpersonal skills
3. There was improvement in self-confidence
4. There is no significant difference between the gender mean scores of change in the communication skills possessed by male and female telecommunication students engaged in problem-based laboratory experience.
5. No significant difference between the gender mean scores of changes in the in the interpersonal skills possessed by male and female
6. No significant difference between the gender mean scores of changes in the self-confidence skills possessed by male and female

Discussion of the Findings

The purpose of this study was to determine the behavioral skills outcome of telecommunication students engaged in problem-based laboratory experience in Polytechnics. The finding that emerged from the study are hereby discussed.

The data presented in Table 1 answered research question. It revealed that communication skills mean score increased more in a telecommunication problem-based laboratory experience than in the conventional lecture/ demonstration laboratory setting. Analysis of covariance was used test the first hypothesis (Table 6) at F-value of (7.381), significant of (.009) and confidence level of 0.005. The shows that there was significant difference between the mean communication skills scores of male and female telecommunication students engaged in problem-based laboratory experience. This means that gender is a factor in determining the communication skills outcome of telecommunication students engaged in problem-based laboratory. This result reveal that further that students' development of communication skills in a problem-based laboratory experience depends on gender.

The above findings appear to support the view of Lunenburg (2010), during interactions in problem based situation, people are confronted with issues and matters that require them to assume certain roles and perform certain tasks to generate desirable outcomes such as communication skills. The findings also seem to contradict the findings of Sinnes (2006) who averred that both males and females have similar approach to scientific inquiry and derive equal benefits.

The data presented in Table 2 provided answer to research question two. It revealed that interpersonal skills outcome of telecommunication students increased with problem based laboratory experience. The result indicated that problem- based laboratory experience is more effective in improving interpersonal skills outcome of telecommunication students than conventional demonstration activities. This is in line with Loyens, Magda and Rikers (2008) who asserted that PBLE helps students to maintain a higher level of motivation towards learning, and shows the importance of responsible, professional attitudes with teamwork values. However, ANCOVA was used to test the second hypothesis (Table 7) at F-value

(7.960), significance of (.009) and confidence level of 0.05. It is obvious from this result that there was significant difference between the mean interpersonal skills outcome of male and female. This implies that gender is a factor in development of interpersonal skill in a problem-based laboratory experience. That is gender is a dependent factor in development of interpersonal skills outcome in a problem based laboratory classroom of telecommunication student in the Polytechnic.

The data presented in Table 3 provided answer to research question three. It revealed that the self-confidence as a behavioral skill can be improved in telecommunication students when exposed to problem-based laboratory experience. In other words, PBLE is effective in improving self-confidence in Polytechnic telecommunication students. The. However, the analysis of covariance used to test the third hypothesis (Table 8) at F-value of (9.602), significance of F (0.002) at confidence level of 0.05. It was revealed that that the mean difference between self-confidence skills outcome of male and female telecommunication students was statistically significant. Hence, the null hypothesis of no significant difference was rejected. This result therefore means that was significant difference between the effectiveness of PBL experience on self-confidence of male and female telecommunication students in the Polytechnic.

Summary of Procedure Used

The study was a pre-test, post-test, quasi-experimental research, designed to determine the Effects behavioral and skills outcome among telecommunication students engaged in problem-based laboratory experience in polytechnics in North Central States of Nigeria. The population for the study was 276 telecommunication students (male and female) Specific objectives of the study were to:

Principal Findings of the Study

The design of the study was interrupted time series analysis is a quasi-experimental design that can evaluate an intervention Time-Series Designs. The area of this study is the North Central Zone of Nigeria. The population of the study comprised of one thousand and sixty-two (1062) telecommunications students in 12 polytechnics in the zone. The sample for this study will comprise 282. The researcher developed and validated instrument was used to collect data in the study. The instrument is titled “Rubrics for Assessing Behavioral and Skills Outcomes of Telecommunication Students Engaged in Problem-Based Laboratory Experience

(RABSOTSEPLE). The rubric is divided into six (6) clusters. Cluster I was assessed communication skills telecommunication students. Cluster II was assessed interpersonal skills of telecommunication students. Cluster III will assess skills outcome of telecommunication student. Then cluster IV was assessed self-confidence telecommunication students. Furthermore, cluster To ensure the face validity of the instrument, copies of the rubrics was given to two experts in the department of electrical electronic technology, Faculty of Vocational and Technical education, and one expert in Measurement and Evaluation, department of Science education, all from University of Nigeria, Nsukka. To ensure the reliability of the instrument, 20 copies of the instrument was trial tested on 20 telecommunication students engaged in problem-based laboratory experience in Federal Polytechnic Bida. The researcher together with 12 research assistants who was properly briefed was use the rubrics to assess the students during problem-based laboratory exercises. Data was analyzed using means, standard deviation and t-test statistics on using SPSS version 22. Mean and standard deviation will be used to answer all the research questions. The interpretation of the mean gain in addition, t-test statistic was used to test all the hypotheses at .05 set as the level of significance.

Conclusion

The need for appropriate and adequate learning outcomes at all education levels is crucial in this contemporary world more than ever before. Educators are often tasked with developing courses and curricula that teach learners how to perform certain procedures by given instructions to learners. This instruction must be designed to provide an optimal, uniform learning experience for all learners. Instructions are often structured or modeled to present the abstract knowledge to learners. The use of model in teaching is usually discipline-specific as representation of a reality to learners. This study found out that students taught intervention behavioral and skills outcomes among telecommunication students engaged in problem-based laboratory experience in polytechnics The mean difference was found to be significant. The study here was an effect of gender on the achievement of behavioral and skills outcomes among telecommunication students engaged in problem-based laboratory experience. The gender effect was found to be significant which favours the male in both models than female. These results therefore showed that instructional design model is more supportive in teaching technique to polytechnic students.

Recommendations

1. Technical teachers should use Behavioral and skills outcomes among telecommunication students engaged in problem-based laboratory experience
2. Technical teachers of telecommunication should prepare their lessons in line with behavioral and skills outcomes guidelines such a way that the students are given ample opportunity to interact freely with the. This will go a long way to improve their academic achievement.
3. National Board for Technical Education (NBTE) should consider review of curriculum for telecommunication with a view to incorporating behavioral and skills outcomes among telecommunication students engaged in problem-based into the teaching of telecommunication

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