

The Effect of Innovative Pedagogy on Learning Performances of TVET Students in Technical Colleges in Lagos State, Nigeria

Doherty, V.F.*¹ and Aneyo, I.A.²

^{1,2} Department of Biological Science, Yaba College of Technology, Lagos, Nigeria

*Corresponding author: funmilayodoherty@yahoo.co.uk.

Abstract

The functionality of the teaching and learning methods of Technical and Vocational Education and Training (TVET) plays an important role in determining its quality. In this study innovative pedagogy is designed for use by TVET teachers at secondary level of education in Lagos. Innovative pedagogy (IP) designed were facilitated peer tutoring and industry based method for classroom teaching. The purpose was to determine the effectiveness of the IP on student learning outcome. The sample for this study consisted of 409 technical students in seven Colleges. The instruments for the quasi experimental study are three respective achievement test designed for each of the three subjects: Electrical Installation Maintenance, Computer Craft Practices and Catering Craft Practices. Capacity building workshop (induction) was organized for teachers with focus on concept of innovative pedagogy integration in classroom. The researchers and teachers developed steps for implementation and lesson plans for the combination of these teaching methods: facilitated peer tutoring + discussion/demonstration methods and Industry based method + discussion/demonstration methods for the three subjects. This paper explains the steps that can be taken by a teacher in implementing Innovative pedagogy. Complete randomized pre-test and post- test design was adopted for the study and the performance of the students were measured by the pre-test and post-test. The findings of the study revealed that learning of the three technical subjects using facilitated peer tutoring and the modified industry based approach in classroom teaching had a positive influence on student performance than learning using the conventional discussion/demonstration method alone. In conclusion, TVET teachers should apply existing teaching methods in a creative way by combining methods that would meet learners' needs and improve their performance.

Keywords: Innovative Pedagogy, TVET, Facilitated Peer Tutoring, Industry-Based Teaching, Conventional Teaching Method,

INTRODUCTION

Technical and vocational education and training (TVET) is the key to promoting socio-economic growth, increasing productivity and ultimately alleviating poverty (UNESCO UNEVOC, 2014). The effectiveness of all education systems depends critically on the quality of teaching and learning in the classrooms, workshops, laboratories and other spaces in which the education takes place (Darling-Hammond, 2016). Teaching and learning in TVET ought to be applied with the best teaching methods for effective result. However, it has been observed that in terms of teaching inputs and learning outcomes, the quality of TVET is below expectation. These expectations can be attained through retraining of TVET teachers and trainers (Mangwiro, 2016). There is increasing awareness on the need to use new teaching methods that are learner- centered, which will encourage and promote productive engagement among learners. It is important to design active pedagogies by establishing a learning environment which is learner-centered that will encourage students to be in control of their learning (Ruthven, Hennessy, and Deaney, 2005).

Pedagogy is any activity consciously designed by a teacher to bring about effective learning in the students, with the aim of motivating and making the student's journey successful and productive throughout life in the 21st century (Wlodkowski, and Ginsberg, 2017). This therefore underscores the importance of adopting active pedagogies by establishing learner-centred approaches that will encourage learners to be in control of their learning. Hence, one of the ways to achieve this is through the adoption and utilization of innovative facilitation approaches (Yuen, 2016). Innovative pedagogy is a learning approach that defines in a new way how knowledge, skills and attitudes are assimilated, produced and used by learners in a manner that equips the learner with relevant knowledge, marketable skills that will earn the learner an income, attitudes and values that demonstrate compassion and caring for self, others and the environment (Nabwire, 2016).

Teaching methods and learning outcomes in TVET are often ignored and there is a need to examine these two aspects that will contribute to the enhancement of TVET quality (Pavlova and Chen, 2019). We need to study and improve the teaching methods that make TVET work best if we really want to enhance its quality. In Nigeria, evidence shows

that teacher-centered methods of teaching is the dominant pedagogical mode in schools. In a study by Faremi, (2014), in Nigerian technical colleges, methods like field trip and e-learning/ICT are not frequently used by the teachers when compared with other methods like demonstration, lecture and assignment methods. Poor and ineffective teaching methods, and inadequate instructional materials can result in poor performance in academics according to Aremu (2000). Most disturbing is that irrespective of global emphasis placed on the role of teachers and trainers on the need to adopt learner-centred approaches in their instructional delivery practices, the TVET system in Nigeria is seen to be predominantly delivered using the traditional teaching methods often characterized by passive learning (Harber, 2017). There is therefore need to develop innovative pedagogy that can be used in TVET schools, which are capable of transforming the teaching and learning domain with a view to attaining quality skills training of students. The innovative pedagogy approach is learner centred and activity based. Implementing innovative pedagogy approach in a 21st century implies that the role of a teacher will change to a facilitator which indicates a shift from a teacher centred to a learner centred approach to learning (Archambault, Wetzel, Foulger, and Kim Williams, 2010). With innovative, more inclusive pedagogic approaches, students' outcomes would be improved, thus helping to close the skills gap/ mismatches experienced in youth transition from education to employment (Venkatraman, de Souza-Daw, and Kaspi, 2018). In line with this, there is therefore need to determine adaptable ways of improving instructional delivery of TVET programmes through innovative pedagogy integration and also determine the effects of these IP integration on students' academic performance.

LITERATURE REVIEW

Innovative pedagogy (IP)

Innovative pedagogy implies the application of existing teaching and learning methods which involve radical changes, but often they result only in incremental adaptations of well-known practices. It is the best mix of teaching methods that may be taken together that would meet the needs of the learner in an informal or formal learning environment. This can be equated with any new action that aims to improve student learning. Innovation is needed to transform TVET and meet the needs of learners and employers. Innovative pedagogy applied in this study are Facilitated peer tutoring and Industry based method. Facilitated Peer Tutoring refers to the use of facilitating and learning strategies in which the learners learn with and from each other with an immediate intervention of the facilitator. FPT encourages active engagement of the learners and promotes mastery, accuracy and fluency in content learning. Industry based method is a method whereby the subject teachers creates opportunities for their students to be linked to related industry, to gain practical skills from experts in the industry related to the topic of study. It is one of the learning approaches that has been practiced all over the world for decades now (Wilson, 1997).

METHODOLOGY

Description of study area – Lagos state

Lagos State, one of the largest cities in Nigeria, is located in the south-western part comprising of six education districts. Participating schools were 5 Government-owned technical secondary schools within the districts. The sample population for this study are 409 Technical II students and 20 teachers drawn from the schools.

Table 1: Sample of participants for the study

Subjects	Student Population	Treatment
Electrical installation and maintenance works	181	CM and FPT and IBM
Computer craft	100	CM and FPT and IBM
Catering craft	94	CM and FPT and IBM
Control	34	CM and FPT and IBM
GRAND TOTAL	409	CM and FPT and IBM

CM= Conventional method; FPT = Facilitated-Peer Tutoring; IBM =Industry-Based Method

Capacity-building workshop (induction) for TVET teachers.

The workshop organized focused on the concept of innovative pedagogy integration in classroom teaching. Teachers in the selected subjects and schools were trained in the use of the two innovative pedagogy approach (Facilitated peer tutoring and industry based methods). The workshop was held to prepare the teachers for the quasi experimental stage where they would use the Innovative pedagogy in teaching the selected topics in the different subjects.

Research Design

Complete randomized pre-test-post-test design was adopted for the study. This design consists of three experimental groups (electrical installation / maintenance, catering practices and computer studies) and one control group (C). There was pre-test and post-test in each set of the experiments, where pre-test served as a measure of students' background knowledge. The experimental group received the treatment using facilitated peer teaching, industry-based teaching and conventional teaching (discussion/demonstration), while the control group was not taught using any method. After the treatment, all the groups were post-tested using same test prepared for pre-test, but in a re-arranged form. The design is presented below:

Table 2: Research design

Class	Experimental group	Pre - test	Treatment	Post - test
R:	E ₁	O ₁	x ₁	O ₂
R:	E ₂	O ₃	x ₂	O ₄
R:	E ₃	O ₅	x ₃	O ₆
R:	C	O ₇	-	O ₈

Innovative Pedagogy (IP) for TVET Teachers

Innovative pedagogy in this guide focuses on the combination of three teaching approaches namely:

- A. Facilitated peer-tutoring method;
- B. Industry based approach;
- C. Discussion method/demonstration method (conventional method)

This was chosen based on literature reviewed, task analysis performed on the content of the subjects selected for the study, primary data collected and interactions with the TVET teachers.

Facilitated Peer-Tutoring Method (FPT). In this innovative method, the facilitator is involved with the role of assigning students into smaller groups using the high achieving students who are more knowledgeable in the given task to act as tutor to help to teach the low achieving students here referred to as 'tutees' in the selected topic or task, having received prior guidance from the teacher. This method can be used in an innovative way to facilitate knowledge, skills at the secondary level education. This approach is used in combination with the discussion and demonstration methods. However, this step is carried out after the discussion/demonstration method.

Steps in Planning and Implementation of Facilitated Peer-Tutoring

The first thing done by the facilitator was to clarify the specific objectives of the tutoring program. The steps are highlighted in Figure 1.

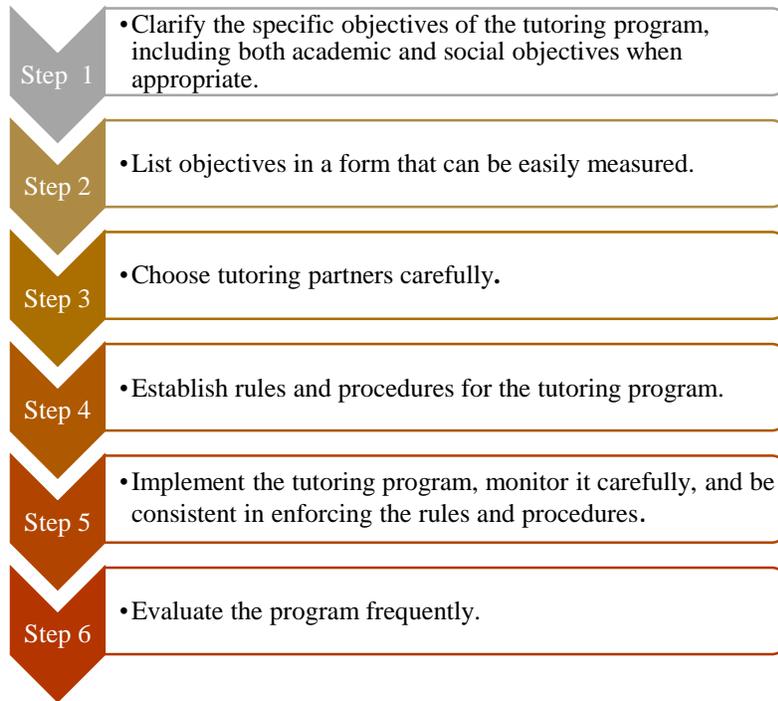


Figure 1: Steps followed in implementing facilitated peer-tutoring teaching method

Industry-Based Method - In using this innovative approach, the facilitator first scheduled a working visit at the industry nearest to the school and established an understanding on the need for such collaboration. The learners with the help of the classroom teacher are taken to the industry for practical experience on the selected topic of interest as contained in the scheme of work. Once this was done, the industry-based facilitator guided the learners through practical demonstration during the scheduled days and time while giving the students opportunities to practice such drills using the right tools and materials, using the learning objectives (LO). This industry-based method is used for a particular topic, and due to time constraints a day was dedicated for this. The facilitator developed a guide for running the lesson at the industry and which includes the goal, how the goal will be reached and ways of measuring how well the goal has been reached during the industry work visits. The use of industry-based learning approach helps to bring about an effective learning of practical concepts or subjects where knowledge, skills and attitude (KSA) will be achieved. The learners understands the theories mainly through their classroom facilitators and move to the industry-based to further learn and practice practical drills particularly in institutions where the training facilities are lacking under the guidance of the facilitators and the industry-based trainers. Figure 2 highlights the steps taken by the TVET facilitator in adopting industry-based approach.

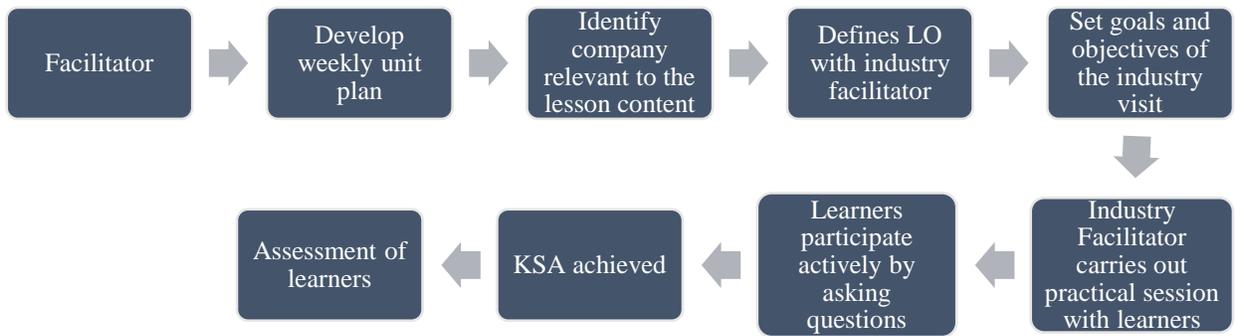


Figure 2: Steps taken by facilitator in adopting the industry-based approach.

Discussion /demonstration Teaching Method- Learners were actively involved in talking and listening to each other. To use this method, the teacher gave suitable foundation for the discussion by posing thought provoking questions, and then stimulates the trainees or learners to discuss the basic questions, and finally guide the discussion to a logical conclusion. The demonstration session involved the learning process of the skill in a step-by-step process by explanation.

Guide designed for utilizing IP

The following steps formed a guide for the TVET teachers in implementing innovative teaching methods in their classroom teaching and learning practices. This is a modified version of Bill Lucas, (2012) framework

Step 1 - identified and set learning outcomes to be achieved by the learner. From the defined objectives, developed the lesson plan to facilitate the achievement of the days' objectives.

Step 2 - identified the nature of the 'subject matter' i.e. the theoretical knowledge, practical skills and underpinning behavior attitude needed to become competent on the stated LO. Industries with the required learning facilities to engage the learners was identified and session time/period for the industry/student session was defined.

Step 3 - performed contextual analysis of the overall learning context by determining the nature and profile of learners. Instructional facilitation method to use was determined.

Step 4 - defined the scope of desired outcomes and the set competencies the learner is expected to develop in the subject area was listed by the facilitator.

Step 5 - defined the range of learning methods and how best to blend them in the training process based on the LOs. Facilitated Peer-tutoring + Conventional Method, Industry-Based Method + Conventional Method.

Step 6 - carried out performance evaluation analysis

Instruments

The instruments for the quasi experimental study are three respective achievement test designed for each of the three subjects, with multiple choice questions designed with four -answers choices. Kuder-Richardson K-R 20 test was used to establish the reliability of the instrument. Electrical Installation Maintenance, Computer Craft Practices and Catering Craft Practices were the selected subjects in this study. Three (3) teaching methods were selected i.e, two innovative pedagogy approach (Facilitated Peer teaching, FPT method and Industry-based method, IBM) and one conventional teaching method (discussion/demonstration).

Sample of Lesson plan prepared by researchers and teacher for Implementing Innovative pedagogy (IP) in classroom teaching.

Combination of Discussion/Demonstration and Industry Based Approach (IP) in learning Catering Craft

Subject: Catering craft
Topic: Puff pastry
Learning (specific) objective(s) [outcomes]
 LO1 Make puff pastry
Performance Criteria:

PC 1 define Puff pastry
PC 2 describe 2 methods of making pastry
PC 3 list the ingredients to make puff pastry
PC 4 demonstrate steps for making puff pastry

Range

Methods of making pastry
Steps for making puff pastry

SCHOOL BASED SESSION

Instructional procedure by the facilitator using the interactive discussion and demonstration methods for the whole class

Step 0 State / explain LOs / PCs

Step 00 Set / review / remind learners of ground rules

Step 1: The facilitator will start by explaining pastry, puff pastry and method of making puff pastry

Step 2: The facilitator will list the ingredient for puff pastry

Step 3: Demonstrate how to make puff pastry observing health and safety rules (and pointing these out to learners)

Step 4 Assessment of LOs / PCs [quiz]

Step 5 Summary – learner[s] will be requested to summarise the session/ write on flip chart

Step 6 Evaluation – learners evaluate the session. What was ‘good’ ‘liked most’; what was liked least / why? How could we improve the session?

Can use video clip produced by facilitator which can be played/ watched several times or real demonstration if time permits.

Learners activity-

- Learners to come up with their own concepts of pastry and different types of pastry. [brain storm]
- Watch in small group the ‘making of pastry’ video clip made by noting down the steps (groups compare lists and steps generated).
- Learners (tutees) are actively asking each other questions, responding, correcting mistakes, and providing positive feedback

INDUSTRY BASED SESSION

Pre –activity before company visit

Facilitator identifies pastry company relevant to the lesson content, communicates and schedules a visit to the company. The facilitator will clearly define the LOs with the industry facilitator and agrees on a day/time in the week for the visit.

Learning (specific) objective(s) [outcomes]

LO1 Make puff pastry using latest industrial equipment and innovation

The facilitator will explain to the learners the evidence to be produced by the them to demonstrate achievement of LOs/PCs

Facilitator explains some background information about the pastry company

Facilitator makes arrangement to take the learners to the pastry company

The facilitator has to ensure that prior understanding has taken place during the discussion/demonstration session of the topic to ensure that IBM is meaningful.

Clarify objectives of the IBM

The facilitator/teacher before leaving the school will explain the objectives of the IBM which is to engage the learners actively and develop their skills in puff pastry using latest/industrial equipment, and improve the learners’ understanding of innovations in pastry industry.

Practical session during industry visit: a day visit

Step 1a: The industry facilitator will put the learners into smaller groups of about 3-5.

Step 1b: The industry facilitator will give the learners up to date information about technologies, processes and latest development in the pastry industry.

Step 2: The industry facilitator will explain the types of pastries and various innovations based on consumers preference.

Step 3: The industry facilitator will list the healthful ingredients(organic) to meet consumer needs and latest commercial equipment that can be used for puff pastry

Step 4: The industry facilitator will demonstrate to the learner, how to make and the steps involved in making puff pastry and identifying the correct ingredient for different consumer preference.

Step 5: The facilitator will encourage the learners to ask questions on areas they find difficult / want further explanations

Step 6: Learner is requested to summarise the session [aided by other learners] – use flip chart to summarise the points

Learner Activity during company based training:

The learners to come up with their own innovative ways of making pastry to satisfy customer demands, compare note and discuss with each other.

Learner Activity after company based training:

Write a report on new things learnt during the visit

21st century skills embedded in approach A

Facilitator to ask open- ended questions like (“Can you go through that step by step?”, “Can you explain why that works?”, “What would happen if ...?”, “Why do you say that?”) (**critical thinking**).

RESULTS

Reliability of the Instrument: Electrical Installation Maintenance, Computer Craft Practices and Catering Craft Practices were the subjects used. The data was analyzed for internal consistency using Kuder-Richardson K-R 20 and yielded a reliability index of 0.95, 0.77 and 0.88 respectively which is high.

Effectiveness of innovative pedagogy approach - TVET teachers were of the view that innovative pedagogy approach will promote students understanding of concepts and academic performance in the following areas; comprehension of concepts, recall of learned concepts, application of learned concepts in execution of project assignment, competency in practical tests and competency in instrument operational skills for work performance (Table 3).

Table 3: Effectiveness of innovative pedagogy approach. (key: strongly agree=3, agree=2, disagree=1).

Variables of students understanding and academic performance	Teachers Response			Total	Mean	Std. Dev	Decision
	3	2	1				
Comprehension of concepts	71	20	-	91	2.78	0.41	Effective
Recall of learned concepts	56	32	3	91	2.58	0.56	Effective
Application of learned concepts in execution of project assignment	63	24	4	91	2.65	0.56	Effective
Competency in practical tests	70	20	1	91	2.76	0.45	Effective
Competency in instrument operational skills for work performance	59	29	3	91	2.62	0.55	Effective
Average					2.00		

Quasi-experimental study

Catering Craft Practices - As shown in Table 4 and Figure 3, learning of Catering Craft Practices using facilitated peer tutoring had a positive influence on student performance. The actual mean score (10.78) of the students taught using facilitated peer tutoring was higher than the actual mean score (4.07) of the students taught using conventional method. Learning of Catering Craft Practices using Industry based approach had a positive influence on student performance. The actual mean score (7.7) of the students taught using Industry based approach was higher than the actual mean score (4.07) of the students taught using conventional method.

Table 4: Performance of Students in Catering Craft Practices from Schools in Lagos when exposed to the teaching methods

Teaching Method	Pre-test O_1	Post-test O_2	Net score, T_n $= O_2 - O_1$
Discussion	4.21	8.29	4.07
Facilitated	5.42	16.20	10.78
Industry	5.35	13.05	7.70

Computer Craft Practices - As shown in Table 5 and Figure 3, learning of Computer Craft Practices using Industry based approach had a positive influence on student performance. The actual mean score (1.60) of the students taught using Industry based approach was higher than the actual mean score (0.45) of the students taught using conventional method. Learning of Computer Craft Practices using facilitated peer tutoring had a positive influence on student performance. The actual mean score (3.95) of the students taught using facilitated peer tutoring was higher than the actual mean score (0.45) of the students taught using the conventional method.

Table 5: Mean Performance of Students in Computer Craft Practices from Schools in Lagos when exposed to the teaching methods

Teaching Method	Pre-test O_1	Post-test O_2	Net score, T_n $= O_2 - O_1$
Discussion	9.85	10.30	0.45
Facilitated	9.26	13.21	3.95
Industry	10.30	11.90	1.60

Electrical installation and maintenance works - As shown in Table 6 and Figure 3, learning of Electrical installation and maintenance works using Industry based approach had a positive influence on student performance. The actual mean score (1.59) of the students taught using Industry based approach was higher than the actual mean score (1.18) of the students taught using conventional method. Learning of Electrical installation and maintenance works using facilitated peer tutoring had a positive influence on student performance. The actual mean score (4.69) of the students taught using facilitated peer tutoring was higher than the actual mean score (1.18) of the students taught using conventional method.

Table 6: Mean Performance of Students in Electrical Installation and Maintenance Works from Schools in Lagos when exposed to the teaching methods

Teaching Method	Pre-test O_1	Post-test O_2	Net score, T_n $= O_2 - O_1$
Discussion	11.42	12.60	1.18
Facilitated	11.63	16.31	4.69
Industry	13.68	15.27	1.59

To determine whether significant difference exists in performance of students in Catering Craft Practices, Computer Craft Practices, and Electrical installation and maintenance works, analysis of covariance (ANCOVA) was done and the result show that there is significant difference in treatment effects.

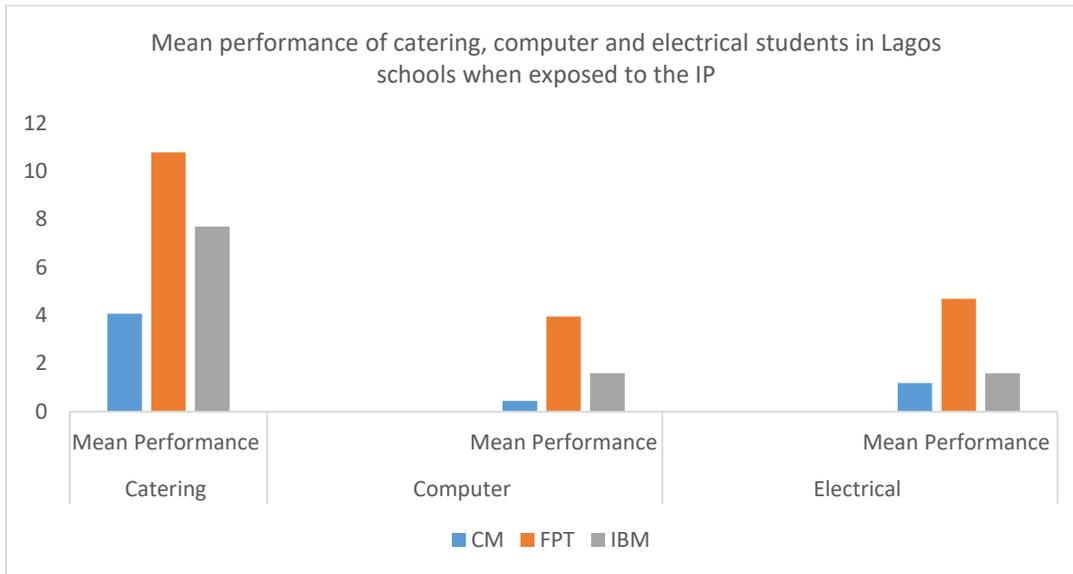


Figure 3: Comparison of Learning of Catering Craft Practices, Computer Craft Practices and Electrical Installation/Maintenance using Facilitated Peer Tutoring, Industry Based Approach (IP) and Conventional Methods had a positive influence on student performance.

Conclusion

The purpose of using innovative approaches in this study was to find ways of engaging the TVET learners, motivate them to learn, effectively enhance skills training and increase student performance. Continuous professional development (CPD) of TVET teachers is needed to enable them to acquire the needed skills required to implement innovative pedagogy. There is need to intensify advocacy efforts by TVET stakeholders on the need for TVET teachers to embrace innovative pedagogy as this will help improve learning outcomes. There is strong evidence suggesting that teaching method is a strong predictor of learning outcomes. Getting the cooperation of the students and teachers to participate in the study was challenging and this was one of the limitations of the study.

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