

RESEARCH ARTICLE

AN OBSERVATION OF CONSTRUCTIVISM INSTRUCTIONAL APPROACH AND ACHIEVEMENT OF METAL WORK STUDENTS IN TECHNICAL COLLEGES IN YOBE STATE, NIGERIA

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ABSTRACT

This study compared two teaching methods, namely, Constructivist (experimental) and Lecture (control) teaching methods on students' achievement in metalwork in technical colleges in Yobe State. The study adopted quasi-experimental research design in which intact classes were used. Two research questions were raised to guide the study, two hypotheses were formulated and tested at 0.05 level of significance. The sample for the study was 58 students. Mean was used to answer the research questions while ANCOVA was employed to test the hypotheses. The study found out that, students in experimental group achieved higher mean score than those in control group. This implies that, constructivist teaching method is better than lecture method in arc and gas welding; and also incasting process. The study therefore recommended that, Metalwork teachers should be trained in the use of constructivist teaching method. National Board for Technical Education should consider review of curriculum for National Technical Certificate in order to incorporate constructivist method as a method of teaching Metalwork.

Key words: Technical College, Metal work, Constructivism and Achievement

INTRODUCTION

The ability of Nigeria to realize the vision of becoming one of the twenty largest economies in the world is largely dependent on the capacity to transform its youth into highly skilled and competent citizens capable of competing globally (Eneh, 2011). A major part of the responsibility for preparing such a workforce rests on the nation's education sector more especially Technical education. It is a type of education that is meant to produce semi-skilled, skilled and technical manpower necessary to restore, re-vitalize, energize, operate and sustain the national economy and substantially reduce unemployment (Ogumbe, 2015). The goal of Technical Vocational Education and Training (TVET) as contained in National Policy on Education (FRN, 2013) should be to:

- Provide trained manpower in applied science, technology and business particularly at craft, advanced craft and technical level;
- Provide technical knowledge and vocational skill necessary for agricultural, commercial and economic development; and
- Give training and impart the necessary skills to individual for self-reliance economically.

In order to realize the stated objectives effectively, there is need to emphasize on Technical College being one of the institutions for the beginning of Technical Education. It is one of the levels saddled with the responsibility of training of vocational and technical education at craft level (Blessing & Oladiran, 2011). According to Ombugus (2013), technical college is designed to prepare individuals to acquire manipulative skills, basic scientific knowledge and attitude required of a craftsman and technician at sub professional level.

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In an attempt to pursue the goal of technical education, the curriculum for technical college is structured in the foundation and trade modules. The components are general education, theory and related courses; workshop practice and Industrial training/production work. The duration of training in technical colleges like in other senior secondary schools is three years for National Business Certificate/National Technical Certificate NBC/NTC, (FRN, 2013). Various trade, such as: Construction trade, engineering trade, Business trade, Miscellaneous trade and modular trade have been designed to meet the overwhelming demand and desire of students and society at large (National Board for Technical Education, 2015). Metalwork is one of the mechanical engineering related trades offered for the award of NTC certificate.

Malgwi and Mbah (2012), identified the followings occupational prospect associated with metalworking:

- Roofing materials: there are opportunities for metalworker in the area of roofing, finishes and services in the building industries. A glance at the cities exposed us to the variety of roofing sheets and designs.
- Welding: there exist great potentials in this sector of general metalworking process. The technical college graduates would excel in this area.
- Panel beating services: the metalworker has opportunities in this service area. Although this sector operates in the formal sector, the technical college graduate would find it rewarding to engage his skills in this area.
- Metal casting and Machining: there are great opportunities in the area using appropriate technology.
- Metal construction: the insecurity in the country has created a potential for the metal worker to excel in the construction of burglar proof for newly constructed houses.

These prospects have provided great opportunities that are supported by the environment for successful entrepreneurial process. The identified occupational prospects above are available in Yobe state communities; as such technical college students can have multiple opportunities after graduation. That is when they opted to be employed or establish their business to become self-employed as specified among their possible options in the National Policy of Education. In most parts of the state for instance, electric arc welders are in common, constructing metallic doors, window, burglar-proof and so many similar product. The above opportunities can be achieved through effective teaching to acquire the necessary knowledge through utilization of variety of instructional approach to meet the societal needs. George (2008), noted that the method used in delivering instruction determines the success of any instruction, and choice of instruction should not be limited to particular method all the time simply because unfamiliarity with the wide variety of instructional approaches that actually exist in educational setting. This tendency can build unnecessary limitations and it can also prevent the effective use of different styles of instructions. Inflexibility of instructional approach can lead a teacher to completely fail to take into account learner differences and reception levels. Unfortunately in Nigeria schools, of which Yobe state schools could not be in exception, traditional method of teaching such as lecture method of teaching is one of the most widely practiced method (Doko& Robert, 2015). Similarly, Ogbuanya, Akintonde and Bakare (2017), revealed that lecture method is widely used in technical colleges and there is no any other method frequently used that is student-centered. During a lecture, there is little or no discussion, the only exchange that may occur between the instructor and students might be a few scattered questions from listeners (Mele, 2018). Ukpongson and Ezekoye (2015) maintained that for developing country like Nigeria to meet the needs of today's workforce TVET programme must move away from teacher-centered learning environment to one where students have the primary responsibility and play an active role in their learning. Jack (2017) who found that the shift from the teacher-centered method of teaching to student-centered activity based method encourages and develops in the students the spirit of inquiry and thereby improves their performance.

This situation calls for other alternative to teacher-centred approach such as constructivist instructional approach which can be used to sustain students' interest and curiosity and also to improve students' academic achievement. According to Bada, (2015) constructivist approach is an instructional approach which tends to shift the main focus from the teacher to the students. The classroom is no longer a place where the teacher being the expert pours knowledge into passive students, who wait like empty container to be filled. In the most general sense, it usually means encouraging students to actively participate in classroom activities (Sarita, 2017).Har (2013) noted that one of the advantages of constructivist teaching method which could make it to be effective and better compared to other conventional methods, is collaborative nature of the methods. Constructivism is a method that has been reported to improve academic achievement among students, this has been confirmed by Oguguo (2015) where he compared achievements of students taught financial accounting using constructivist instructional approach with those taught using conventional method and the constructivist perform better than the conventional group in achievement test.

Oyenuga (2011) also reported that academic achievement of the students will improve significantly if the teacher takes care of the students by adopting good instructional approach. Churcher, Asiedu, and Boniface (2016), stated that academic achievement is a function of many variables including teacher's teaching styles. The hallmark of any teaching is centered on professional methodology especially in the area of presenting the lesson. Therefore, academic achievement should be considered to be a multifaceted construct that comprises different domains of learning (Ricarda, Anja, Anne & Linda, 2017). However in this study the focus is on cognitive domain only, that is to compare constructivist teaching approach with lecture method in teaching metalwork to mechanical engineering craft students in technical college, being one of the institutions where technology education begins.

Technical knowledge and skills are necessary and instrumental to the technological advancement of any nation (Amadi, Chiorlu & Obed, 2016). This connotes that any obstacle in acquisition and delivering of such knowledge and skills can hinder the technological advancement of the nation. Metalwork is one of the subjects offered in technical college, post-junior secondary school where acquisition of technical knowledge and skills begins for those in that trade. The overall successes of knowledge and skill acquisition in technical college depend to a large extend, on effective implementation of its curriculum and appropriateness of teaching method. These are determinants in effective curriculum implementation.

Consequently, Faremi (2014) observed that the lecture method which is teacher-centered is the main teaching methods employed by technical teachers for implementing the curriculum. Obviously, the adoption of only teacher-centered methods of teaching by the teacher results into ineffectiveness in teaching that leads to learning difficulties which in turn affect students' performance negatively (Musa & Hassan, 2015). This persistent poor performance has been partly ascribed to inadequate teaching and instructional methods adopted by technical teachers, and that is why NABTEB chief examiner in his report after May/June 2017 marking exercise suggested that technical teachers should adopt modern teaching method in teaching technical subjects, metalwork inclusive (NABTEB, 2017). This situation is not different in Yobe State in terms of students' performance particularly in metalwork where serious decline in students' academic performance have being recorded in the subject. This persistent failure might end up in producing technical college graduates that cannot further their education, be self-reliant, nor be employed by any organization. Consequently, if they cannot be integrated into one of the three options above, they will not be able to contribute to the technological advancement of the State and the nation at large. So it is evident that the subject cannot thrive without appropriate instructional methods. As such, exploring the most effective method between constructivist teaching method and lecture method to teach the subject became a major concern.

Purpose of the Study: The main purpose of this study is to observe the effect of constructivist teaching approach on academic achievement of metalwork students in technical colleges in Yobe state. Specifically, the study intended to;

- Determine the mean academic achievement of metalwork students taught arc and gas welding with

constructivists' teaching approach and those taught with lecture method in technical colleges in Yobe State

- Determine the mean academic achievement of metalwork students taught casting processes with constructivists' teaching approach and those taught with lecture method in technical colleges in Yobe State

Research Questions

The following questions were used to guide the study

- What is the academic achievement scores of metalwork students taught arc and gas welding with constructivists' teaching approach and those taught with lecture method in technical colleges in Yobe State?
- What is the academic achievement scores of metalwork students taught casting processes with constructivists' teaching approach and those taught with lecture method in technical colleges in Yobe State?

Research Hypotheses

The following hypotheses were formulated to guide the study.

H₀₁ There is no significant difference in the mean academic achievement scores of metalwork students taught arc and gas welding with constructivists' teaching approach and those taught with lecture method in technical colleges in Yobe State.

H₀₂ There is no significant difference in the mean academic achievement scores of metalwork students taught casting processes with constructivists' teaching approach and those taught with lecture method in technical colleges in Yobe State.

METHODOLOGY

The design for the study was quasi-experimental pretest, post-test non-equivalent control group. Sambo (2005) defined quasi-experiments as a design which involved assignment, but not random assignment of participants to groups, in other words, entire classrooms, not individual students, are assigned to treatments. The design was chosen and considered appropriate for the study because school authorities will hardly allow a researcher to disrupt their normal school setting for the purpose of creating a true experimental group hence intact class was used. The geographical area of the study is Yobe State, which is situated in Northeastern Nigeria. The target population for the study consisted of 74 students of NTC II in all Government Science and Technical Colleges that are offering metalwork. This covered students from three Government Science and Technical College located in Potiskum, Damagum and Geidam. Purposive sampling technique was employed to sample out 58 NTC II students.

The instrument for the study is multiple choice test items tagged "Metal Work Achievement Test (MWAT)". It consisted of two sections, A and B. Each section has 20 questions making a total of forty (40) researcher-made objective questions. Section A asked questions on gas and arc welding while section B on casting process. The instrument was validated by three experts, two from Modibbo Adama University of Technology Yola to check the adequacy of content, logical sequence and suitability of the technical terms used; and one from Government Science and Technical College Damagum to check the content of the instrument against

NABTEB syllabus. Test re-test procedure was employed in determining the reliability of the instrument and reliability coefficient of 0.82 was obtained, which is within the acceptable range of reliability of the instrument. The scores obtained from the pre-test and post-test was analyzed using mean and standard deviation to answer the research questions, while Analysis of covariance (ANCOVA) was used for testing the null hypotheses at 0.05 level of significance.

RESULTS

Research question 1: What is the mean academic achievement scores of metalwork students taught arc and gas welding with constructivists' teaching approach and those taught with lecture method in technical colleges in Yobe State? The data that provided answer to this research question were analyzed and presented in Table 1. The data presented in Table 1 shows that in arc and gas welding section of MWAT, experimental group has a pre-test mean score of 4.85 with a standard deviation of 1.52, while the control group has a pretest mean score of 5.12 and the standard deviation of 1.51. There is slight spread out in both the tests scores based on standard deviation of 1.52 for the experimental group as against 1.51 for the control group. In the post-test, the mean scores for the experimental students increased from 4.85 to 13.94 while for the control group the mean score increased from a mean score of 5.12 to 9.16. But when compared with the experimental group, it was low. The table also shows that the mean gain difference was 9.09 for experimental group and 4.04 in lecture method. This implies that the students taught arc and gas welding with constructivist teaching method performed better in the achievement test than those taught with lecture method. The finding here shows that constructivist teaching method is the better method in teaching arc and gas welding compared to lecture method.

Research question 2: What is the mean academic achievement scores of metalwork students taught casting processes with constructivists' teaching approach and those taught with lecture method in technical colleges in Yobe State? The data that provided answer to this research question were analyzed and presented in Table 2. Table 2 shows that prior to the use of constructivist method in teaching casting process to metalwork students in the experimental group, the mean score was 4.62 while the standard deviation was 1.18. The control group has a pretest mean score of 4.84 and the standard deviation of 1.46. The standard deviation indicates that there is slight closeness in the test scores. In posttest, the mean scores for experimental group is 12.64 while for the control group the mean score was 10.68. The table also shows that the mean gain difference was 8.02 for experimental group and 5.84 for control group. This implies that the students taught casting process with constructivist teaching method performed better in the achievement test than those taught with lecture method. The result shows that constructivist teaching method is the better method in teaching casting process compared to lecture method.

Hypothesis 1: There is no significant difference in the mean academic achievement scores of metalwork students taught arc and gas welding with constructivists' teaching approach and those taught with lecture method in technical colleges in Yobe State. The data that were used in testing this hypothesis were analyzed using Analyses of Covariance and presented in Table 3

Table 1. Means Achievement Score and Standard Deviations of Pretest and Posttest of Experimental and Control Groups on arc and gas welding

Group	Symbol	Pre-test	Post-test	Mean Gain
Experimental Group (Constructivists Method)	N	33	33	
	\bar{X}	4.85	13.94	9.09
	SD	1.52	1.60	
Control Group (Lecture Method)	N	25	25	
	\bar{X}	5.12	9.16	4.04
	SD	1.51	2.06	

N = Number of Subjects; \bar{X} = Mean and SD = Standard Deviation

Table 2: Means Achievement Score and Standard Deviations of Pretest and Posttest of Experimental and Control Groups on casting process

Group	Symbol	Pre-test	Post-test	Mean Gain
Experimental Group (Constructivists Method)	N	33	33	
	\bar{X}	4.62	12.64	8.02
	SD	1.18	1.97	
Control Group (Lecture Method)	N	25	25	
	\bar{X}	4.84	10.68	5.84
	SD	1.46	2.75	

N = Number of Subjects; \bar{X} = Mean and SD = Standard Deviation

Table 3. Analysis of Covariance of the Mean Achievement Scores of Students Taught Arc and Gas Welding with two different teaching methods

Source of Variance	Sum of Squares	DF	Mean Square	F	Sig. of F (p-value)
Corrected Model	325.05 ^a	2	162.53	48.82	.00
Intercept	616.44	1	616.44	185.17	.00
Pre Test (Covariate)	.138	1	.138	.041	.84
Group (Teaching Methods)	323.49	1	323.49	97.17	.00
Error	183.10	55	3.33		
Total	8693.00	58			
Corrected Total	508.16	57			

Table 4. Analysis of Covariance of the Mean Achievement Scores of Students Taught Casting Process with two different teaching methods

Source of Variance	Sum of Squares	DF	Mean Square	F	Sig. of F (p-value)
Corrected Model	184.28 ^a	2	92.14	17.53	.00
Intercept	453.26	1	453.26	86.23	.00
Pretest (Covariate)	15.84	1	15.84	3.01	.09
Group (Teaching Methods)	180.17	1	180.17	34.28	.00
Error	289.12	55	5.26		
Total	9737.00	58			
Corrected Total	473.40	57			

Table 3 reveals that the F value of pretest is 0.041 with significant of F at 0.84 which is greater than 0.05. It implies that there is no significant different in the covariate. Also in the table the F-calculated value for teaching methods (1, 55) is 97.17 with p-value of 0.00. Since the p value of 0.00 is less than 0.05, the null hypothesis is therefore rejected. Meaning there is significant difference between the mean achievement scores of students taught arc and gas welding with constructivist method and those taught with lecture method. The result here proved that there is a significant different in effectiveness of constructivist and lecture teaching method in teaching arc and gas welding.

Hypothesis 2: There is no significant difference in the mean academic achievement scores of metalwork students taught casting processes with constructivists' teaching approach and those taught with lecture method in technical colleges in Yobe State. The data that were used in testing this hypothesis were analyzed using Analyses of Covariance and presented in Table 7 above reveals that the F-calculated value of covariate is 3.01 with significant of F at 0.09 which is greater than 0.05 indicating that there is no significant different in the pretest.

The F-calculated value for teaching methods (1, 55) is 34.28 with p-value of 0.00. Since the p value of 0.00 is less than 0.05, the null hypothesis is therefore rejected. Hence, there is significant difference between the mean achievement scores of students taught casting process with constructivist teaching method and those taught with lecture method. It implies that there is a significant different in effectiveness of constructivist and lecture teaching method in teaching casting process.

RESULTS

- Constructivists' teaching method is a better teaching approach than lecture method in teaching arc and gas welding in Technical Colleges in Yobe State
- Constructivists' teaching method is a better teaching approach than lecture method in teaching casting process in Technical Colleges in Yobe State
- There is a significant difference in the achievement of metal work students when taught using constructivists' teaching method with the one taught using lecture method in teaching arc and gas welding

- There is a significant difference in the achievement of students when taught using constructivists' teaching method with those taught using lecture method in teaching casting process

DISCUSSION OF FINDING

The students taught arc and gas welding and casting process with constructivist method performed better in the achievement test than those taught with lecture method. Meaning that, constructivist method is a better method of teaching arc and gas welding and casting process to metalwork students. This is in conformity with Oguguo (2015) and Har (2013) who experimented and found that constructivist method of teaching in better than the conventional method of teaching accounting. Har (2013) also stated that one of the advantage of constructivist teaching method which can make it to be effective and better compare to other conventional methods, is collaborative nature of the methods. Learners in constructivist teaching collaborate to arrive at a shared understanding of truth in a specific field through scaffolding. The hypotheses also show that, there is significant difference in the achievements of metal work students when taught using constructivist method and that taught using conventional method.

This implies that the different between the achievements of the two groups is statistically significance, which equally means that there is a significant effect of constructivist method in teaching arc and gas welding, casting processes etc. This is in line with the findings of Musa and Hassan (2015), who conducted a study on effect of using constructivist instructional approach on students' academic achievement in Auto mechanics in Yobe state technical colleges. Findings revealed that, during the pre-test, both groups were found to possess equivalent entry behavior, and in post-test experimental group (those that were taught using constructivist method) performed better than the control group (those that were taught using lecture method of teaching. A possible explanation for the effectiveness of the constructivist method is the shift from teacher centered to student-centered in learning process. Ukpongson and Ezekoye (2015) maintained that for developing country like Nigeria to meet the needs of today's workforce TVET programme must move away from teacher-centered learning environment to one where students have the primary responsibility and play an active role in their learning. It is also in line with Jack (2017) who found that the shift from the teacher-centered method of teaching to student-centered activity based method encourages and develops in the students the spirit of inquiry and thereby improves their performance.

Conclusion

The study found out that the use of constructivist teaching method is more effective compared to lecture method in improving the academic achievement of metalwork students in the technical colleges. Drawing from the findings of this study, it can be concluded that for metalwork students to do well, constructivist teaching method should be employed in teaching metalwork. This will motivate and promote the interest of the students haven noticed their good results .It will also encourage parents, and teachers would be proud of using the method, being an effective means of teaching Metalwork.

Recommendations

- In line with the findings of this study, the researcher proffered the following recommendations:

- Metalwork teachers should be trained in the use of constructivist instructional method in the classroom so as to improve the academic achievement of technical college students in Yobe State.
- In training the teachers, workshops, seminars and conferences should be organized by educational administrators of Technical Colleges to enlighten technical teachers and improve their knowledge and skills on the use of constructivist method.
- National Board for Technical Education (NBTE) should consider review of curriculum for National Technical Certificate in order to incorporate constructivist instructional technique as a method of teaching Metalwork.
- Yobe State policy makers in the area of technical education should make it compulsory for school authorities/management to adopt constructivist method in teaching Metalwork so that Metalwork teachers can employ the method in the classroom.

REFERENCES

- Amadi, S. W.;Chiorlu, D. O., &Obed, O. O., 2016. Assessment of facilities for teaching metalwork in vocational technical colleges in Rivers state of Nigeria.*International Journal of Operational Research in Management, Social Science and Education*, 2(1), 64-74. Retrieved from <http://internationalpolicybrief.org>
- Bada, S. O. 2015. Constructivist learning theory: A paradigm for teaching and learning. *IOSR Journal of Research and Method in Education*, 5(6), 66-70. Retrieved from <http://spdf.semanticscholar.org>
- Blessing, F. A. & Oladiran, S. O. 2011. Basic technology textbooks in Nigeria secondary schools: a quality and content analysis. *Journal of International Cooperation in Education*, 14(2), 153-168
- Churher, K. A.; Asiedu, L. O.;& Boniface, B. S. 2016. Teachers teaching styles and students study habits on academic achievement in mathematics among junior high schools in upper east region of Ghana. *International Journal of Educational Administration*, 8 (1), 35-51. Retrieved from<http://www.ripublish.com>
- Doko, C. M., and Robert, O. O. 2015. The effect of computer-assisted instructional package for teaching metalwork technology at Nigerian Certificate in Education level. *International Journal of Academic Research in Progressive Education and Development* 4(1), 56-66. 10.6007/IJARTED/v4-i1/1454
- Eneh, O. C. 2011. Nigeria's Vision 20:2020-Issues, Challenges and Implications for Development Management. *Asian Journal of Rural Development*, 1 (1), 21-40. 10.3923/ajrd.2011.21.40
- Faremi, Y. A. 2014. Assessment of teaching strategies adopted for effective implementation of science subjects and trade modules curriculum in Nigerian technical colleges. *Journal of Educational and Social Research*.4(6), 391-396. 10.5901/jesr.2014.v4n6p391
- Federal Republic of Nigeria 2013. *National policy on education*. Abuja; NERDC
- George, A. 2008. *A manual of practice teaching*.New Delhi, India; Ajay Verma
- Har, L. B. 2013. Constructivist learning and teaching.*The Hang Kong institute of Education*. Retrieved from www.ied.edu.hk/aiclass/

- Jack, G. U. 2017. The effect of learning cycle constructivist-based approach on students' academic achievement and attitude towards chemistry in secondary schools in north-eastern part of Nigeria. *Educational Research and Reviews* 12(7), 456-466. 10.5897/ERR2016.3095
- Malgwi, P. A. & Mbah, C. O. 2012. Entrepreneurial prospects in the metalworking industries: A challenge to technical teacher education. *Nigerian Journal of Technology Teacher Education*, 3(1), 37-43
- Mele, E. F. 2018. *Introduction to teaching profession*. Yola, Nigeria; Paraclete Publishers (Educational).
- Musa, A. & Hassan, U. M. 2015. Effects of using constructivist instructional approach on students' academic achievement in auto-mechanic in government technical colleges of Yobe state. *Nigerian Journal of Technology Teacher Education* 5(1), 242-249
- National Board for Technical Education 2012. *National business and technical examination board syllabus for engineering trade*. Abuja; NBTE
- National Business and Technical Examination Board 2017. *Chief examiner's report on the 2017 May/June NBC/NTC examination*. Retrieved February 17, 2018 from <http://nabtebnigeria.org/wp-content/uploads/2018/08/Chief-Examiners-Report-May-June-2017-Examinations.pdf>
- Ogbuanya, T. C., Akintonde, A. A., & Bakare, J. 2017. Assessment of practical skill training of technical colleges students in electrical and electronic trade in Osun state Nigeria. *International Journal of Applied Engineering Research*, 12(18), 7501-7515.
- Oguguo, B. C. E. 2015. Effects of constructivist method of teaching on students' achievement in financial accounting: issues and challenges for accountancy education development. *Knowledge Review*, 33(2), 1-7.
- Ogumbe, B. F. 2015. *Assessment of mechanical engineering craft practice production units in technical colleges in south-south zone of Nigeria*. Unpublished Doctoral Dissertation; University of Nigeria, Nsukka.
- Ombugus, D. A. 2013. *Development and validation of workshop-based processes skill tests in mechanical engineering craft for assessing students in technical colleges in Nasarawa state Nigeria*. Unpublished Doctoral Dissertation; University of Nigeria, Nsukka.
- Oyenuga, A.O. 2011. *Effect of models on interest and academic achievement of auto-mechanics students in technical colleges in lagos-state*. Unpublished Doctoral dissertation; University of Nigeria, Nsukka.
- Ricarda, S.; Anja, M.; Anne, F. W. & Linda, W. 2017. *Academic achievement*. Retrieved March 26, 2018. 10.1093/OBO/9780199756810-0108
- Sambo, A. A. (2005). *Research method in education*. Ibadan; Stirling-Horden publishers (Nig) Ltd
- Sarita, P. 2017. Constructivism: A new paradigm in teaching and learning. *International Journal of Academic Research and Development*, 2(4), 183-186. Retrieved from www.academicjournal.com
- Ukpongson, M. & Ezekoye, B. N. 2015. (2015). Improving instructional delivery in technical vocational education and training for sustainable economic diversification. In A. S. Baffa, F. O. N. Onyekwu, R. O. Okwori, A. U. Igwe & C. O. Igwe (Eds). *Proceeding of the 28th Annual Conference and Annual General Meeting of Nigerian Association of Teachers of Technology* 340-355. Lagos; NATT
