

Effect of Youtube Videos on Students' Academic Achievement in Mechanical Engineering Craft Practice in Technical Colleges in Rivers State

Koko, Joshua Gift

Department of Technical Education
Ignatius Ajuru University of Education

DOI: 10.56201/ijee.v8.no4.2022.pg16.24

Abstract

The aim of this study is to ascertain the effect of YouTube videos on Students' academic achievement in Mechanical Engineering Craft Practice in technical Colleges in Rivers. Specifically, the study sought to ascertain the effect of YouTube videos on Students' academic achievement in welding operations in technical Colleges in Rivers State. One research question and one hypothesis guided the study. The study adopted a quasi-experimental design. The population for the study consisted of 53 NTC 2 students of Mechanical Engineering Craft Practice in all the approved technical Colleges in Rivers and the entire population of 53 students were used for the study. The instrument was sent to three experts in the Department of Industrial Technical Education, Ignatius Ajuru University of Education, Port Harcourt. The experts carried out both content and face validity to ascertain the suitability of the items in the instrument. To ensure the reliability of the instruments, 15 copies of the Mechanical Engineering Craft Practice Achievement Test (MECPAT) were administered on 15 NTC 2 students in Federal Science and Technical College Ahoada. These students were not part of the population of the study. Thereafter Kuder-Richardson 20 formula was applied which yielded a reliability of 0.85 indicating that the instrument was reliable. The data gathered from the study were analyzed using mean, standard deviation, and Analysis of Covariance (ANCOVA). The mean and standard deviation were used to analyze the research questions. A mean gain indicates that the experimental group performed more than the control group, while a mean loss indicates a better performance in the Mechanical Engineering Craft Practice Achievement Test (MECPAT) in favour of the control group. The Analysis of Covariance ANCOVA was used to test the null hypotheses at .05 degree of significance. In testing the hypothesis, when the F-ratio is greater than .05 the null hypothesis is accepted, when the F-ratio is less than .05 the null hypothesis is rejected.

Key Words: Mechanical Engineering craft practice, Welding, YouTube, Academic Achievement

Introduction

Technical Vocational Education and Training (TVET) is an indispensable tool for national development as no nation can attain a high level of economic, industrial and technological growth without it. Technical Vocational Education and Training (TVET) is any education or

training designed primarily to prepare individuals for a job. Technical Vocational Education and Training (TVET) “is a comprehensive term referring to those aspects of the educational processes involving, in addition to general education the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life” (Federal Republic of Nigeria 2013: pp 16). Technical Vocational Education and Training (TVET) is a sort of education designed to create the skilled and technical labor force required to revive, energise, operate, and sustain the country's economy as well as significantly lower unemployment. (Okoye & Arimonu, 2016). The FRN (2013) identified three aims of TVET namely: providing skilled individuals in the applied sciences, technology, and business especially at craft, advanced craft, and technical levels; providing individuals with the theoretical knowledge and practical skills necessary for agricultural, commercial, and economic development and to train and impart the needed skills to craftsmen who shall be self-reliant economically.

In Nigeria, technical colleges are the principal institutions where TVET can be acquired. Technical College system was adopted as the first level of post basic education with common curriculum in all the technical colleges accredited by National Board for Technical Education (NBTE) in Nigeria. According to Umunadi (2013) technical colleges were established to prepare individuals to acquire manipulative skills, basic scientific knowledge and attitude required of craftsmen and technicians at sub professional level. Also, technical Colleges are established institutions where students are trained to obtain relevant knowledge and skills in different occupations for employment in the world of work. The education provided at the technical college is based on the fundamentals of industrial production. Federal Republic of Nigeria (2013) pointed out that the main feature of the curriculum activity for technical Colleges shall be structured in foundation and trade modules, the curriculum for each trade shall consist of general education, theory of related courses, workshop practice, industrial training, small business management and entrepreneurial training. Technical colleges offer training in a variety of technical and vocational fields, such as woodworking, metalworking, electrical installation, radio and television work, air conditioning and refrigeration, carpentry and joinery, furniture making, baking, tailoring, dressmaking, typing, shorthand, accounting, spinning, weaving, dyeing, and bleaching, vocational agriculture, agricultural machine work, home economics, and mechanical engineering craft practice.

Mechanical Engineering Craft Practice is a trade in Nigeria Technical Colleges designed to produce competent craftsmen in various Metalwork Trades. Beako (2018) Stated that Mechanical Engineering Craft Practice is one of the severally recognized engineering fields that start from the practice of machine and mechanized processes, particularly concerned with power generation, transmission, utilization of tools and equipment. The subject matter of Mechanical Engineering Craft Practice is specifically designed to provide the skills and knowledge to fulfill the needs of the modern industry. Throughout the course emphasis is on practical training and theoretical knowledge. (Federal Republic of Nigeria 2001). The Mechanical Craft Practice also involves training students on the application of hand and machine tools of various types. Ogumbe, (2015) stated that Mechanical Engineering Craft Practice provides a post primary technical education and practical proficiency in turning and machining to the level of good craftsman. Okwelle, Beako and Ojotule (2019) further expatiated that mechanical craft practice at the technical College level also includes panel beating and car body works, air conditioning and refrigeration, auto-electrical works, motor vehicle mechanic works, welding, forging, foundry, fitting and machine operations.”

Welding is the most economic method of joining metals together. According to Thompson Rivers University (2013) welding is a joining process in which metals are heated, melted, and mixed to produce a joint with properties like those of the materials being joined. It is a permanent method for joining metal components together. Welding finds its usability in the construction of roads, railways, building construction, aircraft manufacturing. The aim of fabrication and welding program in technical colleges is to produce skilled craftsmen with good knowledge of the application of welding equipment, materials, techniques, and safety practices in welding of metal projects. Graduates of welding should be able to carry out gas welding and cutting jobs on all types of metals, produce simple finished structural steel work projects safely, use relevant equipment and techniques, apply protective wetting against corrosion on finished metal projects and market finished metal projects. Sheet metalwork, gas welding and cutting, metal arc welding and structural steel work are areas where students are to be equipped and prepared for the world of work. Additionally, these students are expected to make, join, and repair the metal parts for a massive range of machinery, equipment, and structures. During the training regular assessment is given to the learners to determine their level of achievement in the trade course.

Achievement is the product of mastery of concepts. Achievement therefore may be said to be an accomplishment or the ability to perform the desired task. Academic achievement is defined as the attained ability or degree of competence in school tasks, usually measured by standardized test and expressed in grades or units based on norms derived from a wide sampling of pupils' achievement (Osuafor & Orji 2017). It can still be thought as as the anticipated result of learning from pupils through time, which could be successful or unsuccessful. Academic success might be cognitive or psychomotor in nature. The cognitive domain includes learning and the improvement of cognitive abilities.

These include the ability to recall or recognize particular facts, logical sequences, and conceptual frameworks that support the growth of intellectual capacities and talents. Therefore, learning in this area could range from more intellectual abilities like identifying and choosing the best or the combination of acceptable techniques in metalwork projects to more practical knowledge like remembering safety guidelines to follow in the workshop. On either hand, the improvement of physical skill coordination is important for psychomotor domain achievement. This domain's objectives place an emphasis on motor abilities, manipulating objects or topics, or performing an action that calls for neuromuscular coordination. This could involve performing a task, such as tightening a screw with a screwdriver, or it could involve employing a variety of tools and equipment to overhaul a machine. (Obed & Tom 2020). To improve the academic achievement of Mechanical Engineering Craft Practice students, it is important for teachers to employ instructional materials since the teacher alone cannot provide all the required conditions for effective and efficient teaching.

Teaching aids are those materials which help the teacher to make a lesson more interesting, more explicit, more meaningful, functional, and real to the learners. Teaching aids are those materials and equipment that assist the teacher to effectively communicate his/her idea to the learners (Amaele & Amaele 2010). These materials may be in form of human beings, animals, or inanimate objects like model, prints, graphics, charts, pictures, radio, television, posters and educational videos.

Videos can be obtained from YouTube. YouTube site is free for all registered users to upload and watch videos online. The uploaded videos can also be watched by anybody. According to Edache-Abah, & Mumuni, (2019) the videos are anything from beginner videos to more professional videos including educational videos. YouTube, being very popular, has become

one of the most used websites and a large resource for educational content. The site has millions of videos tagged as educational, many of them uploaded by teachers, students, and researchers. YouTube is not only meant for digital entertainment, but it can also be a great environment for learning and should be used in eLearning, which can truly benefit every eLearning student/audience. Ali (2019) explained that YouTube videos can be used directly in the classroom as part of the teaching and learning process. They are usually used to introduce and explain some new concepts while teaching, by displaying information for the class to see, or at the end of the lesson to recommend some websites. YouTube videos can also be used as an educational resource, where the teacher uses the video as a model for classroom activities and discussions. Universities and Schools are currently incorporating free video platforms like YouTube into their classrooms' activities.

YouTube Sessions are produced either by teachers, content developers or lecturers themselves, using some learnable software, like webcam, one can easily upload educational contents to YouTube. The link is then attached in the course contents where the students can watch it at their convenience or on demand. These videos shared can be made public or private. Sherer & Shea, (2011) delineated that the use of YouTube videos during teaching improves presentations, since more sense are alerted. It is vital therefore for teachers to add instructional technology to their teaching to grab Students' attention, focus students' concentration, generate interest in the class, draw on students' imagination, improve attitude toward content and learning and to make learning fun. This will go a long way in building the scientific attitude in the students.

YouTube videos have the advantages of accessibility, versatility, breadth of content and up-to-date materials which help teachers and students to form and contribute to course content and improve students' engagement in classroom activities. In higher education teaching and learning, people are increasingly using online videos. For faculty and students, YouTube has become one of the leading examples of video sharing resources that can empower students in their education, engaging classroom discussion, and achieve learning goals effectively inside as well as outside of the classroom. It is against this background; the study was conducted to determine the effect of YouTube videos on students' academic achievement in Mechanical Engineering Craft Practice in technical colleges in Rivers State.

Statement of the Problem

Mechanical Engineering Craft Practice is a trade in Nigeria technical colleges designed to produce competent craftsmen in various metalwork trades. The subject matter of Mechanical Engineering Craft Practice is specifically designed to provide the skills and knowledge to fill the needs of the modern industry. Sadly, many technical colleges in Nigeria do not have the human and material resources required for teaching the relevant skills and for some that have, the teaching resources are either not relevant or grossly inadequate. In some technical Colleges, tools and equipment are borrowed for external examinations (Okoye & Okwelle, 2013). This ugly situation has made subjects meant to be taught practically are now taught theoretically thereby limiting Students' comprehension of the subject matter. As a result, there have been persistence poor academic performance of technical college students in NABTEB examinations over the years (Eze, 2018 & Onwusa, 2020). It is crucial for educators to develop new strategies for improving instruction. YouTube videos are one way to raise the caliber of instruction. YouTube has become a valuable instructional resource and a teaching supplement. As a free teaching and learning resource, YouTube is a significant consideration for educational budgets. Due to the increased viewing of YouTube videos among learners, academicians and practitioners are questioning whether students' activities

and performance will positively be affected by online and offline videos. The study is therefore designed to determine the effect of YouTube videos on students' academic achievement in Mechanical Engineering Craft Practice in technical Colleges in Rivers.

Aim/Objectives of the Study

The aim of this study is to ascertain the effect of YouTube videos on Students' academic achievement in Mechanical Engineering Craft Practice in technical Colleges in Rivers. Specifically, the study sought to ascertain the effect of YouTube videos on Students' academic achievement in welding operations in technical Colleges in Rivers State.

Research Question

What is the effect of YouTube videos on Students' academic achievement in welding operations in technical Colleges in Rivers State?

Hypotheses

The null hypothesis were formulated and tested at .05 level of significance.

H₀₁ There is no significant difference between the mean achievement scores of students taught welding operations using YouTube videos and those taught with posters.

Methodology

This study adopted a quasi-experimental design. This research design was appropriate because quasi-experimental research is a research design which can be employed without disrupting the academic activities of the school. According to Donald, Cheser & Sorensen, (2010) in quasi experimental research it is impossible to randomly assign subjects to treatment groups. Neither the school system nor the parents would want a researcher to decide to which classrooms students were assigned.

The population for the study consisted of 53 NTC 2 students of Mechanical Engineering Craft Practice in all the approved technical Colleges in Rivers. The distribution of the population are as follows; Government Technical College, Ahoada 20 students, Government Technical College, Port Harcourt 25 students, Government Technical College, Ele-Ogu 0 and Government Technical College, Tombia 8 students. Since the population of the students is small the entire population of 53 students were used for the study. Thus, no sampling was carried out. This is in congruence with Ogundu (2018) who posited that when a study has a manageable population, the entire population can be studied

To determine the validity of the instrument, copies of the instrument were sent to three experts in the Department of Industrial Technical Education, Ignatius Ajuru University of Education, Port Harcourt. The experts carried out both content and face validity to ascertain the suitability of the items in the instrument. The experts reworded, deleted, added, and generally assessed and commented on the clarity and appropriateness of the instruments' items for improvement towards better realization of the study's objectives. The researcher effected all the corrections made by the experts before producing the final draft which was issued to the students.

To ensure the reliability of the instruments, 15 copies of the Mechanical Engineering Craft Practice Achievement Test (MECPAT) were administered on 15 NTC 2 students in Federal Science and Technical College Ahoada. These students were not part of the population of the study. Thereafter Kuder-Richardson 20 formula was applied ($\frac{k}{k-1} (1 - \frac{EPQ}{S^2})$) which yielded a reliability of 0.85 indicating that the instrument was reliable.

The Mechanical Engineering Craft Practice Achievement Test (MEPCAT) was administered on the experimental and control groups through the aid of different teachers. Each copy of the MEPCAT was personally handed down to these teachers. The instrument was administered on the experimental and control groups as pre-test, thereafter the treatment was applied to the experimental group. At the end of the treatment, the instruments were reshuffled and re-administered on the experimental and control groups as post-test. At the end of the test the teachers retrieved the 53 copies of the instrument which were administered to the respondents.

In other to gather data from the respondents, a teacher made test was developed by the researcher. The instrument was titled Mechanical Engineering Craft Practice Achievement Test (MECPAT). The instrument consisted of 20 items objective test questions which were based on the topic taught during the experiments.

This research adopted a two-group static design. The respondents were divided into two groups, the experimental and the control group. Twenty-eight students from Government Technical College, Ahoada and Government Technical College, Tombia were used as the control group while 25 students from Government Technical College, Port Harcourt formed the experimental or treatment group. Both groups were given a pre-test, thereafter the treatment was applied to the experimental group. After the treatment was applied, the items of the instruments were reshuffled and re-administered as post-test to both groups.

The researcher made effects to ensure that extraneous variables would not affect the outcome of the findings. These extraneous variables include experimental bias, the teacher variable, the learning environment and inter group contamination. To avoid experimental bias, the class teachers of each group at the technical colleges were used for the study to teach their students in both experimental and control groups. This means that the researcher was not directly involved in the implementation, or administration of the instruments.

The data gathered from the study were analyzed using mean, standard deviation, and Analysis of Covariance (ANCOVA). The mean and standard deviation were used to analyze the research questions. A mean gain indicates that the experimental group performed more than the control group, while a mean loss indicates a better performance in the Mechanical Engineering Craft Practice Achievement Test (MECPAT) in favour of the control group. The Analysis of Covariance ANCOVA was used to test the null hypotheses at .05 degree of significance. In testing the hypothesis, when the F-ratio is greater than .05 the null hypothesis is accepted, when the F-ratio is less than .05 the null hypothesis is rejected.

Data Presentation

Research Question 1: What is the effect of YouTube videos on Students' academic achievement in welding operations in technical Colleges in Rivers State?

Table 1: Pretest Posttest Means Scores on The Effect of YouTube on Students' Academic Achievement in Welding Operations in Technical Colleges in Rivers State.

Groups	No	Pre-test		Post-test		Mean Gain	Mean Difference
		\bar{X}	SD	\bar{X}	SD		
Experimental	25	10.07	2.82	17.27	2.01	7.20	2.05
Control	28	10.04	2.81	15.19	2.83	5.15	

Source: Field Survey 2022

Table 1 shows the pre-test and post-test mean scores of both experimental and control groups on the effect of YouTube on students' academic achievement in welding operations in technical colleges in Rivers State. The results show that the students in the experimental group had a pre-test mean score of 10.07 and with a standard deviation of 2.82 and a post-test mean score of 17.27 with a standard deviation of 2.01. The control group had a pre-test mean score of 10.04 with a standard deviation of 2.81 and a post-test mean score of 15.19 and a standard deviation of 2.83. A mean difference of 2.05 was obtained indicating that the experimental group taught welding operation with YouTube videos performed better than the control groups taught with posters.

Hypothesis

H₀₁: There is no significant difference between the mean achievement scores of students taught welding operations with YouTube videos and those taught with poster

Table 2: Analysis of Covariance (ANCOVA) Between Students Taught Welding Operations with YouTube Videos and Those Taught with Poster

Source	Type III sum of squares	Df	Mean Square	F	Sig
Corrected Model	23166.401 ^a	2	11583.201	18.716	.000
Intercept	28199.852	1	28199.852	45.565	.000
Postest1	333.490	1	333.490	.539	.466
Group	22731.457	1	22731.457	36.729	.000
Error	30944.617	50	618.892		
Total	5598416.000	53			
Corrected Total	54111.019	52			

Source: Field Survey 2022

Table 6 shows the result of analysis of covariance (ANCOVA) between students taught welding operations using YouTube videos and those taught with posters. The result showed that f-calculated ratio in the two groups is 36.739 and it is significant at level 0.00. It therefore implies that the null hypothesis is rejected since the significant value (P) is less than .05 ($P < .05$). Thus, there is a significant difference in the mean scores of students taught welding operations with YouTube videos and those taught with poster only.

Research question one examined the effect of YouTube videos on Students' academic achievement in welding operations in technical Colleges in Rivers State. Based on the data gathered and analyzed, the study revealed that students taught welding operations with YouTube videos had higher mean score in the post Mechanical Engineering Craft Practice Achievement Test (MECPAT) than those taught with posters. In addition, a significant difference existed between the mean achievement scores of students taught welding operations with YouTube videos and those taught with posters. The findings of the study are in harmony with the findings of Gambari, Yaki, Gana & Ughovwa (2014) who reported that students taught with multimedia instruction performed better than their counterparts taught

with posters. This can be alluded to the fact that multimedia provides the opportunity for students to read text on the screen, view the animation and listen to narration concurrently.

Summary and Conclusion

Supplementing classroom instruction with YouTube videos is a very effective tool and strategy for teaching welding operations in technical colleges in Rivers State.

Recommendation

A workshop should be organized to train Mechanical Engineering Craft Practice teachers in the four technical Colleges in Rivers State on how to search, upload, download and save videos of welding operations from YouTube.

References

- Ali, S. (2019). Impacts of watching videos on academic performance at university level. *European Journal of Education Studies*, 6(3), 114-124.
- Amaele, S., & Amaele, P. E. (2011). *Teacher education in contemporary society*. Rodi Printing and Publishing Company.
- Beako T. Y. (2018). *Emerging technical skills expected of students of motor vehicle mechanic works for sustainable manpower development in Rivers*. [Unpublished master's Dissertation]. Rivers University and Technology.
- Donald, A. Chesser, L.J. & Sorensen, K. C. (2010). Introduction to research in education. Cengage Learning.
- Edache-Abah, O. F. & Mumuni, A. A. O. (2019). Effect of YouTube on performance of secondary school students in biology concepts in Ikwerre Local Government Area of Rivers. *International Journal of Engineering Science Invention*, 8(8), 54-61.
- Eze, T. I., & Onwusa, S. C. (2020). Effect of computer-assisted instruction on academic achievement and interest of high and low achieving auto-mechanics technology students in technical Colleges. *Journal of Humanities and Social Science*, 25(8), 22-32.
- Federal Republic of Nigeria (2001). *Mechanical engineering craft national technical certificate (NTC) and advanced national technical certificate (ANTC) curriculum and module specifications*. NBTE Press.
- Federal Republic of Nigeria (2013). *National policy on education*. NERDC Press.
- Gambari, A. I., Shittu, A. T., Daramola, F. O. & Jimoh, M. A. (2016). Effects of video instructional packages on achievement of senior secondary school students in mathematics in Minna. *Journal of Science, Technology & Education*, 4(2), 179-196.
- Obed, O. O. & Tom, C. C. (2020). Effect of problem-based teaching technique on students' performance in refrigeration craft in technical Colleges in Rivers *International Journal of Innovative Psychology & Social Development*, 8(1), 28-36.
- Ogumbe, B. E. (2015). *Assessment of Mechanical Engineering Craft Practice production units in technical Colleges in the south – south zone of Nigeria*. [Unpublished doctoral dissertation]. University of Nigeria, Nsukka.

- Ogundu, I. (2018). *Conducting and writing research in technical and vocational education and training*. Emeks Publishers.
- Okoye, K. R. E. & Okwelle, P. C. (2013). Private-public partnership and technical vocational education and training (TVET) in a developing economy. *Arabian Journal of Business and Management Review*, (2)10, 51-59.
- Okoye, R. & Arimonu, M.O. (2016). Technical and vocational education in Nigeria: Issues, challenges and way forward. *Journal of Education and Practice*, 7(3), 113-118.
- Okwelle, P. C., Beako, Y. T., & Ojotule, I. D. (2019) Mechanical craft practice trade facilities and competencies required for soaring sustainable national productivity in Rivers. *European Journal of Educational and Development Psychology*, 7(3), 46-55.
- Osuafor, A. M. & Orji, C. J. (2017). Effect of problem-solving technique on secondary school students' academic achievement in selected topics in algebra. *Elixir Education Technology*, 107(7) 47250-47253.
- Sherer, P., & Shea, T. (2011). Using online video to support student learning and engagement. *College Teaching*, 59(2), 56-59.
- Thompson Rivers University. (2013). *Welding safety procedures*. Retrieved on the 24th of April 2021. From <https://www.tru.ca>
- Umunadi, E, K. (2013). Functional vocational and technical education curriculum for sustainable youth empowerment in Nigeria. *European Centre for Research Training and Development*, 1(1), 7-13.