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METHODS OF TEACHING TECHNICAL SUBJECTS IN TECHNICAL COLLEGES AND TECHNOLOGICAL INSTITUTIONS: ISSUES AND SOLUTIONS

[1]Dr. U.A. Kwami and [2]S. S. Manabete, PhD
[1]National Commission for Colleges of Education, Abuja, Nigeria
[2]Department of Science and Technology Education, University of Jos, Nigeria

Email: manabete2002@gmail.com

ABSTRACT

Technical and vocational education is that type of education that equips individuals with skills and knowledge that make them to be productive and sel af-reliant. Because it is practical-oriented, it requires certain methods, commonly referred to as technical methods, to impart the skills and knowledge. The technical methods refer to strategies used by teachers to ensure effective learning takes place. Common among the methods is the lecture method which has been found to be teacher-centred, offering very little opportunity for the class to get involved in the lesson. With advances in science, there has been the need to evolve other pedagogies that will blend the teaching of technical subjects with science. Consequently, such methods as demonstration, discussion, discovery, project work, and field trips, have been found to be very useful. The paper argues that no one single method of teaching can lead to the full realization of the instructional objectives hence, the need to use a combination of methods. Several problems impede the teaching of technical subjects in technical colleges and technological institutions. These problems include lack of workshops and laboratories, lack of practical materials, poor funding, and ill-equipped libraries. The paper suggests that teachers need to update their knowledge and receive further training in their fields of specialization. The teachers need to improvise practical materials where it becomes necessary. Equally, government needs to increase funding to technical colleges and technological institutions.

KEY WORDS: Teaching methods, Technical colleges, Technological institutions

INTRODUCTION

The term "technical and vocational education (TVE)" refers to the type of education provided to citizens which equips them with knowledge and skills that will make them self-reliant and contribute their quota to the development of society. In order for individuals to receive the skills and knowledge that will make them self-reliant, they need to be taught. To do this, certain teaching methods are necessary. Consequently, in the times in which we live educationists, educators and teachers are now thinking about new ways to teach TVE subjects in particular and science and arts subjects in general. The traditional lecture method, employed mainly by teachers during Nigeria's pre-and-post colonial days, has been found to be untenable. The traditional teaching method, leaning more towards teacher-centredness, excluded learners more from participating in the lesson. The coming of knowledge-based training however, "ushered interdisciplinary approaches to learning and the establishment of academic link with industries and the society by breaking down academic disciplines" (Okuta & Yayock, n.d.). With this, the authors argued that the classroom ceased to be an exclusive reserve of the teacher for knowledge dissemination where students become passive learners.

In this paper, the term "technical and vocational education" (TVE) has been considered. It outlines some of the subjects that are in TVE. It defines what teaching methods are and discusses the types of teaching methods teachers use to teach TVE subjects. Finally the paper identifies the problems that impede the effective teaching of technical subjects in technical colleges and technological institutions, and then proffers solutions to them.

Technical and Vocational Education

Technical and vocational education refers to the type of education which equips individuals with knowledge and skills that will make them functionally employed and self-reliant. Self-reliance is used here to refer to the "ability of an individual to be self-employed and productive" (Bichi, 2007). TVE, according to Sarki, Jah and Nankumah (2014), refers to the "aspect of education which prepares candidates for occupations requiring manipulative skills". UNESCO and ILO (2002) define TVET as "those aspects of the educational process 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." The National Policy on Education (Federal Republic of Nigeria, FRN, 2014) spells out the goals of TVE, inter alia: to provide trained manpower in the applied sciences, technology and commerce, particularly at sub-professional level; to provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; and to give training and impart the necessary skills to individuals who shall be self-reliant and enterprising economically.

Technical Subjects in TVET

By technical subject is meant "a course devoted to practical study such as engineering, technology… business, or other work-related subjects. It also refers to a wider field of study such as art or music. Both of them combined are called technical and vocational subjects" (Patwa, 2019). TVET has been identified by Ekpenyong (2011) to include the following broad subject areas:

1. Technical education
    a) Engineering technology and related sub-fields
    b) Electrical/electronic technology and related sub-fields
    c) Building technology and related sub-fields
    d) Automobile engineering and related sub-fields
2. Business Education
    a) Office/Secretarial Studies/Office Technology Management
    b) Accounting Studies
    c) Distributive or Marketing Studies
    d) General Business Studies
3. Agricultural Education
    a) Agronomy
    b) Soil SCIENCE
    c) Agricultural Engineering
4. Home Economics
    a) Home Science
    b) Food Science
    c) Clothing and Textiles
    d) Hotel and Catering Management

Teaching Methods

Teaching is known be an art as well as a profession. In this paper, consideration is given to teaching as an art. According to Elom (2014), as an art, the quality of teaching depends on the love and dedication the teacher has towards the subject he is teaching. Teaching in TVE requires skills that are acquired through participation and practice. Because of this, the technical teacher is one who exists in two worlds: the world of the classroom and the world of workshops and laboratories (Akpan, 2008). In the classroom, the technical teacher uses the skills and knowledge of his subject to teach with a view to imparting the knowledge to his students. In the workshop or laboratory, the teacher imparts technical skills to students by way of practical demonstration. The practical skills imparted in students result in the production of goods and services.

In teaching skills and competencies in TVET, trainers, teachers and instructors need to use appropriate teaching methods. To achieve this however, there are key factors, or the didactics, that need to be taken into consideration, such as the target group (considering their individual characteristics and expectations), the topic of the lesson, objectives, and means to control the learning session (Wiekenberg, 2014). The full import of the didactics will not be realized if the principles of teaching the TVE subjects are not taken into consideration. Consequently, Wiekenberg argued that the key principle of teaching is motivation. When students are motivated, interest is created in them. Interest then creates commitment which finally leads to successful learning.

Teaching methods are strategies used by teachers to ensure effective learning takes place (Ogu, 2000). Eze and Nwaukwa (2018) perceived of teaching methods as a set of strategic activities employed by teachers for transferring knowledge, skills and positive attitude intended at turning the learner into an enterprising person. Teaching methods are generally divided into approaches, that is teacher-centred and child-centred approaches. The teacher-centred approach is also known as direct instruction and the child-centred approach is known as indirect instruction (Offiong, 2010).

Some of the common methods of teaching technical subjects have been identified by Ahmad and others (2017), and Rustamov et al. (2021). These are demonstration method, project method, discussion method, discovery method, lecture method, case studies, role playing, field trip, brainstorming, conferencing, creative assignment method, and programmed instruction. In a study by Okuta and Yayock (n.d.), it was found that creative knowledge, critical thinking, problem solving skills, higher thinking order, communication and confidence were the teaching strategies employed the most by teachers in the 21st century.

Generally, teaching methods are many and varied. Lathan (n.d.) listed over 80 teaching methods. The broad list only provides help in understanding varieties of teaching methods in use in contemporary world. Essentially, these teaching methods are peculiar to various fields of study. In other words, there are certain teaching methods that may prove useful to the field of TVE but unsuitable for law, for instance. For a field like TVE, teaching methods such as textbook assignments, demonstration, lecture, research projects, class projects, field trips, individual projects, laboratory experiments, and video lessons, may prove useful.

The Lecture Method of Teaching

In this method, the teacher is the active person in the teaching-learning process, while learners are passive. That is why the method is generally referred to as teacher-centred. According to Ahmad et al. (2017), the lecture method of teaching provides too little room for students to negotiate a construct meaning in the teaching-learning process and does not aid in the development of vital skills such as communication skills, creative skills, interpersonal skills, and problem solving skills, among others.

In this globalized world where knowledge competition has become imperative for the use of technology towards self-reliance, the traditional teacher-centred method of teaching technical subjects is not tenable. Again, advances in science have necessitated the need to evolve other pedagogies that will blend the teaching of technical subjects with science (Okuta & Yayock, n.d.). Consequently, the traditional teaching method presented the following worrying conditions (Mirza, 2012): Students are already swayed away from the objective (as they just sit and copy notes and do not pay attention to the teacher), long and boring presentations (here, fixed set of presentation is adhered to by the teacher who has no time for practice), and teachers lack new and flexible methods. The teachers lack the new methods that can recognize the nature of students' learning abilities and motivate them to learn.

Certain areas of concern regarding the traditional chalk-and-talk method has been noted by Damodharan and Rengarajan (n.d.), which include the fact that teachers often continuously talk for an hour without knowing students response and feedback, the material presented is only based on lecturer notes and textbooks, the handwriting of the lecturer decides the fate of the

subject, there is insufficient interaction with students in classroom, more emphasis has been given on theory without any practical and real life time situations, and learning from memorization but not understanding.

Practical Teaching Approaches

Technical and vocational education **(**TVE) is a practical-oriented type of education which requires some practical approach in its teaching. The practical aspect of TVE requires a workshop or laboratory or both for effective teaching. Practical teaching approaches, according to Nasir et al. (2020), undertaken in workshops used by teachers play an important role in the teaching and learning process. This position becomes clearer when we consider that the teacher will be required to focus attention on the teaching content and interaction with students (Lucas, Spencer & Claxton, 2012). Generally, teaching content is directed towards the way students learn (Hattie, 2012). Normally content should be presented in step to facilitate easy comprehension. On the whole, the success of the lesson using practical approaches, depends to a large extent, on the teacher (considering his knowledge of subject matter, his familiarity with and ability to utilize the various teaching approaches and the students who understand the lesson and its objectives (Ismail et al., 2017).

A study by Nasir and others (2020) on teachers' practical teaching approaches for electronics course in technical colleges found that demonstration and hand notes were frequently used by teachers while diagrams and video clips use were sometimes used by teachers. The found these methods to be for lesson beginning. Concept maps, use of diagrams, class discussion, small group discussion, questions and answers and practical work were frequently used at the level of idea generation. Practical approaches of demonstration, small group discussion, and practical work project were frequently used by teachers and were at the level of strengthening ideas. Project report, discussion and assignment were frequently used by teachers at the level of application of ideas. Invention and problem-solving were also used by the teachers at the level of application of ideas. At the level of reflection, the study found also that answering questions in small groups, answering questions openly in the class and reflection in groups were frequently used by teachers.

Demonstration Method

One important method of teaching which has proven useful in teaching technical subjects is demonstration. Okon and Ibang (2010) defined demonstration as a technique for teaching concepts, principles or real things by combining oral explanation with manipulation of real objects, materials and equipment. Demonstration as a method of teaching combines the sense of hearing, smell and sight, and helps students to understand the lesson very clearly (Akpan, 2001). The method also helps to hold and sustain students' interest in the lesson. Above all, demonstration, according Eze and Nwaukwa (2018), provides useful experience for students for easy comprehension of the lesson. Speaking on sustaining demonstration, Scribd (2010) argued that learners are likely to lose confidence in the teacher if the demonstration fails. Consequently, the demonstration at this point serves as an agent of learning (Beal, 2008). Scribd added therefore, that a lot of interest, attention, motivation, humour and curiosity is likely to be generated if the teacher speaks clearly, uses simple, direct and dynamic demonstration.

There are shades in which demonstration can occur. As Offiong (2010) pointed out, demonstration method of teaching can occur in any of the following shades:

a) Teacher-Demonstration: Under this, the teacher performs the activities while the students watch, listen and record observation.
b) Teacher-Student Demonstration: Here the students assist the teacher in direct handling of the facilities for demonstration.
c) Students Group Demonstration: In this case, the students are divided into groups to assist the teacher in turn to perform the demonstration.

Mbah and Azubike (2015) provided the procedure and presentation of the lesson using the demonstration method of teaching, as follows:

1. A theme is selected and the content of demonstration defined
2. Basic objectives are stated
3. Adequate and appropriate equipment and materials are provided
4. The key points to be demonstrated are outlined
5. Ensure that the above listed procedure is orderly arranged

Mbah and Azbuke (2015) also held that to start the lesson using the demonstration method of teaching, the introduction must be clear, in which the purpose and expected outcomes of the lesson are explained to the students, seats are arranged to ensure a clear view by all students e.g. teacher, student, and all distractions are removed. The authors argued thus: demonstration should be simple and brief, all materials and equipment must be functioning and arranged in proper order of presentation, demonstration can be supported with instructional materials like pictures and charts to aid students' comprehension, and evaluation at every stage of the demonstration is necessary to ensure clear understanding. Equally, demonstration method of teaching is good for both small and large groups, can be used for both indoor and outdoor instructions, and for vocational, technical and science subjects, Demonstration can also be used for easy understanding of contents and instructions, and for skills that might be too ambiguous for students to learn.

Demonstration gives rise to what has come to be known as learning by doing. Learning by doing is the best way to learn practical tasks. After a class demonstration of a practical task, students learn better when they begin to interact with the task. A teacher demonstrates how to decouple and couple a motor car engine. Or a teacher demonstrates how to wire electric bulbs in series and parallel. Students will learn when they begin to dismantle the motor car engine and then try to couple it back. The same thing goes with the series and parallel wiring. Of course there will be hiccups along the way initially. However, gradually the students are able to carry out the tasks successfully. As Snevana (2014) explained, the "The 'learning by doing' pedagogy is the most effective in traditional setting where students can create their own things."

Learning by doing over a long period of time, initially acquired through demonstration also provides experience. This way an individual has been taught through experience. Put another way, conscientiously bringing members from different social and economic backgrounds together in a class whereby they freely interact with one another serves as a way of teaching in which members get to know each other. Experience, according to Noga (2014), means acquiring learning through action. The author explained that a teacher can create an active group from a given class. This way, members of the class get to know each other as they share their ideas and perspectives. Through this, they have learnt from each other, and are able to build trust and openness. It has the advantage of braking boredom of the school routine

Discovery Method of Teaching

This method is associated with searching for information in a library. A teacher has presented the class with a problem. They arrive the library, search for literature relating to the problem and find solution to the problem (Snevana, 2014). According to Mba and Azubike (2015), discovery method of teaching is a lesson designed in such a way that room is created for a student to discover facts behind the lesson by himself using his own mental process. The facts the student discovers are concepts and principles. However, the authors contend that to successfully discover the concepts and principles, the students must perform processes such as observing, classifying, measuring, predicting, describing, and informing.

With the advent of the internet, discovery method of teaching TVE subjects becomes much easier to undertake. Here, students can stay where computers and internet services are available. The place could be their homes, classrooms, the institution's library or any other place. So long there is internet service, students can browse up solutions to their academic assignments.

Nowadays, with the advent of high fidelity mobile phones, students are able to solve their class assignments with ease.

The discovery method of teaching has certain vital procedures a teacher needs to adopt. Mba and Azubike (2015) outlined the procedures as follows:

a. All the discovery lessons should be activity-based.
b. Summary of activities should be done through a sequence of questions drawn.
c. The entire class can be grouped into smaller groups.
d. Unit of lessons should be broken down into series of questions prepared in a card.
e. The question should be based on the various contents of the lessons.
f. Each lesson must have a time frame

Discussion Method

Nowadays with online facilities like web technology and other social networks, students can easily use discussion and share lecture documents (Snevana, 2014). Using the social networks, students are able to share information about their lecture timetables and other indoor and outdoor events. Assignments can also be shared online and other course materials. When the number of participants is high in a discussion session, Noga (2014) suggests that panel discussion be used. In this method, some outstanding members of the class are selected to engage in discussion on a particular topic while other members of the class sit and listen. Noga argued that using plenary leads to achieving best results in teaching technical and vocational lessons. Again, a roundtable discussion creates in members of the panel a sense of freedom and quality. The teacher only organizes the panel.

Brainstorming

This is another method of teaching employed by teachers to teach TVET lessons, and finds wide application when searching for new ideas, introducing a new topic, during previous knowledge stage to ginger students to recall knowledge gained in previous knowledge, and when searching for alternatives of problem solving.

There are procedures that need to be followed in using brainstorming to teach a TVE lesson. Wiekenberg (2014) provided the following procedures:

a. Describe the topic and records on the blackboard.
b. Give a brief summary of the rules of a brainstorming session.
c. Let the group generate ideas for some minutes and let each member write it down.
d. Collect all ideas and present them on a pinboard or on the blackboard.
e. Don't rush to interrupt the flow of ideas.
f. Stop the process if there are no more ideas and if enough ideas are available.
g. Clarify each idea.
h. Analyse the results/ideas and decide together with the group which items can be combined to get meaningful clusters of similar ideas.

Wiekenberg (2014) warned however that there are rules governing the use of brainstorming to teach TVE lessons. These rules are that there should be no criticism of any ideas, rather exaggeration should be encouraged, the more ideas the better, teacher needs to record all ideas, everybody must participate and every idea is important, and speed is important.

The Puzzle Method of Teaching

A vital method of teaching TVE subjects is the puzzle method. In this method, the class is divided into smaller groups consisting of equal number of students in the groups. Each student in a group is given a sub-topic to work on. The number of sub-topics equals the number of students in the group. In using puzzle method of teaching, Noga (2014) describes how the lesson looks like:

1. In the introductory stage of the lesson, teacher shortly presents students with the subject of the meeting and then divides them into groups.
2. All the students get supplementary materials and additionally within each group, everybody gets a different subject to work on.
3. Students individually acquaint themselves with a given topic.
4. "Expert" groups meet in a consultation session (students appointed with the same topic exchange their opinions and solve the common problems together).
5. Then, in the initial groups, they share their knowledge with other members of the team.
6. The final stage of the lesson is when the teacher checks the knowledge or the skills acquired by the students.
7. Students may also exchange their queries.

The teacher then proceeds to mark each student's work. Noga (2014) stressed that the puzzle method of teaching appears to be demanding and time consuming. However, it has the advantage of creating a natural, unrestrained atmosphere.

Field Trips

Field trips and excursions are an important method of teaching TVE subjects. Nowadays, this method of teaching appears to be extinct in many colleges and universities. What is mainly accountable for this development is the increasing number of strikes, especially by tertiary institutions, the cost of undertaking the exercise and the readiness of excursion guides. Due to increasing insecurity in Nigeria over the last decade, where cases of armed attacks and abductions appear rampant, teachers appear to be unwilling to serve as excursion guides for students on field trips. Again school authorities, due to poor funding, are unable to provide vehicles and funds to assist students go on field trips and excursions. The students themselves appear not to be financially buoyant to contribute towards funding the exercise.

Need for Modern Methods of Teaching

In this globalized world, teachers and educators must have a rethink about the methods and strategies they the use to teach technical and vocational education lessons. As Wieckenberg (2014) argued, the world outside of a school is changing, hence the following reasons to use modern methods: changing job requirements, existing gap between the world of work and the world of education, need to align learning objectives to social needs, and new demands in education due to globalization. Others are the emergence of knowledge society, the overall trend to lifelong learning, and the growing importance of generic skills. It must be added that there is no lesson that employs only one single method of teaching. There is the need to employ a number of methods. For instance, in teaching technical drawing, teachers often adopted wall maps, blackboard and chalk, and expression of meanings of drawings by model demonstration (Akpan, 2001). Again, a study by Fletcher, Djajalaksana and Eison (2012) found that in teaching career and technical education, interactive lecture, questioning, whole-group discussion, and guided practice, were mostly used. Online lecture, video creation, student-generated examinations and quizzes were infrequently used.

Other studies by Ahmad (2012), and Ahmad and others (2017) provided evidence which suggests that while teaching a lesson on electric diesel and automotive diesel, teachers do not use one single method of teaching; instead they use a number of methods. Whatever methods of teaching are used however, Bannister (2007) cautioned that they must be in line with the aim the teacher attaches to his work. The author has summarized two aims of teaching technical subjects, namely, to present technical information so that it can be understood and acquired, and to develop the students' ability for rational reasoning. Furthermore, the choice of a particular teaching method needs to take into consideration students' learning. By learning here is meant change in the behaviour of students, occasioned by teaching which has occurred. Brown (2004) saw learning as acquiring facts or procedures that are to be used.

Problems of Teaching Technical Subjects

Technical subjects are generally practical-oriented subjects. They would therefore, require certain tools and equipment, and other items like consumables to effectively teach them. Besides this, concerted steps must be taken to handle them. Unfortunately, in technical and technological institutions, the situation is a pitiable one. Consequently, some of the problems impeding the effective teaching of technical subjects are inadequate number of trained manpower, poorly equipped workshops and laboratories, poor supply of electric power, and inadequate funding. Others are lack of consumables, ill-equipped libraries with e-learning facilities, poor perceptual image of technical subjects, and poor reward system for technical staff.

It does seem that since the Shagari Regime when concerted effort was made to transfer technology to Nigeria both in kind and in knowledge, but mainly in knowledge - the technical know-how-Nigeria's effort at technological development has waned over the years. The long years of military rule, corruption, poor budgetary allocation to education, occasioned mainly by poor policy and programme prioritization, technical and technological institutions in Nigeria have been "battling" to survive. Poor funding, inadequate method for impartation of skills and knowledge, and poor morale of technical teachers have led to the production of poorly equipped graduates who lack the necessary knowledge and skills that will enable them to compete favourably with their counterparts from other institutions in Africa and beyond.

One challenge that teachers exhibit in teaching technical subjects is their inability to use befitting teaching methods for certain tasks. For instance, a study by Elom (2014) found that teachers in technical colleges were teaching technical drawing-a technical subject-using just the traditional method of teaching. Practical method of teaching was not emphasized due mainly to the fact that in many schools, technical drawing instruments were not available. This goes back to explain the fact many graduates of technical colleges and technological institutions lack the practical skills required to justify the technical and vocational education they pursued while in school. Again, teaching styles appear peculiar to a teacher based on his own characteristics. A teaching style that appears most effective is one which demonstrates "a combination of teaching techniques, knowledge of subject matter, enthusiasm for teaching and sensitivity to another's own characteristics" (Elom, 2014).

CONCLUSION AND RECOMMENDATIONS

Technical and vocational education requires certain teaching methods which are capable of leading to the realization of set objectives. Such teaching methods are intended to communicate the lesson content to students who are expected to have acquired some learning. The paper has considered some commonly used methods such as demonstration, lecture, discovery, field trip and excursion, and puzzle. Of course other methods as hand notes and inquiry method are useful in conveying TVE lessons. Use of hand notes by teachers as a method of teaching technical subjects has been found to be viable in a study by Nasir (2016). The study found that the use of hand notes provides students with the initial idea of the lesson to learn and prompts them to prepare to learn in a class. The hand notes however, must be clear and comprehensive. In enquiry method of teaching, students rely less on the teacher. The teacher offers support and guidance as students work on projects. By so doing, the students take on more active and participatory roles. The students design and construct different projects and go as far as developing their own questions using online resources (Lathan, n.d.).

Numerous problems have been pointed out in the paper which impede the smooth use of the teaching methods to teach technical subjects. Lack of instructional materials which often ends in teachers just using the lecture method without demonstrations, poor funding, and lack of workshops and laboratories, are some the problems. In view of these problems, and in order to successfully teach TVE subjects using appropriate teaching methods, the following suggestions are proffered:

1. Technical teachers need to update their knowledge and skills through continuous training programmes, either on short duration or long duration basis, such as workshops and seminars and full time study in a university.
2. Excursions and field trips need to be encouraged, supported and pursued with vigour. School authorities and students can partner in sponsoring the trips.
3. In line with the provision of the National Policy on Education, government needs to build workshops and laboratories in required numbers so that practical methods of teaching can easily be carried out by teachers and students.
4. In the face of dearth of instructional materials for the conduct of practical lessons, teachers need to improvise. Students can help teachers in the improvization process by bringing from the neighbourhood any material which can aid the teacher in lesson delivery.
5. There is need for teachers to use a variety of teaching methods. This makes the presentation of the lesson easier and aids in arousing the interest of students in the lesson. This calls for the fact that teachers need to acquaint themselves with a variety of teaching methods.
6. Teachers need to use teaching methods that can convey the senses of hearing and seeing. This calls for the fact that audio-visual devices need to be provided in technical and technological institutions across Nigeria.

REFERENCES

Ahmad, A. (2012). *Vocational teaching method practices in automotive practical work for vocational secondary school*. Unpublished PhD Thesis, University of Technology, Johor Bahru, Malaisia.

Ahmad, A. Nordin, M.K., Ali, D.F., Nabil, M.M. & Latip, A.B. (2017). Practices in vocational teaching method to improve the quality of teaching. *The Social Sciences, 12*(3), 413-418.

Akpan, S. (2001). Research on the feature of Engineering Graphic Education and the Application of CAL. *Enugu. Higher Education Research, 2*, 55-58.

Akpan, A.A. (2008). Improvement of the teaching of vocational technical education through scientific supervision. *African Research Review, 2*(1), 198-212.

Bannister, S. (2007). The quality of technical teaching some aspects of teaching method. Retrieved 20th July 2022, from https://www.tandfrontline.com.

Beal, C. A. (2008). Playing entrepreneurship: Can games make a difference? *Entrepreneurial Practice Review*, *2*(4), 4-18.

Bichi, A. B. (2007). Technology education for self-reliance and sustainable development. *Zaria Journal of Educational Studies, 9*(1), 40-45.

Brown, G. (2004). *How students learn*. Abingdon, Oxford: Routledge Falmer.

Damodharan, V.S. & Rengarajan, V. (n.d.). Innovative methods of teaching. Retrieved 20th July 2022, from https://www.researchgate.net.

Ekpemyong, E. L. (2011). *Foundations of technical and vocational education: Evolution and practice for Nigerian students in TVE and Adult Education, Policy Makers and Practitioners.* Benin City: Supreme Publishers International Ltd.

Elom, E.N. (2014). Effective teaching and learning in technical colleges: Challenges of technical colleges. *Journal of Educational Policy and Entrepreneurial Research, 1*(1), 76-86.

Eze, T.I. & Nwaukwa, V.E. (2018). Effectiveness of demonstration method in entrepreneurship education in tertiary institutions in South-South Nigeria. *NAU Journal of Technology and Vocational Education 3*(1), 44-53.

Federal Republic of Nigeria (2014). *National policy on education*. Lagos: NERDC Press.

Fletcher, E.C., Djajalaksana, Y. & Eison, J. (2012). Instructional strategy use of faculty in career and technical education. *Journal of Career and Technical Education, 27*(2), 69-83.

Hattie, J. (2012). *Visible learning for teachers*. New York & London: Routledge

Ismail, Khuzainey & Nopiah, Z & Rasul, Md. Mustaun & Leong, P. (2017). Malaysian teachers' competency in technical vocational education and training: A review. 59-64.

Lathan, J. (n.d.). The complete list of teaching methods. Retrieved 25th July 2022, from https://onlinedegrees.sandiego.edu.

Lucas, B., Spencer, E. & Claxton, G. (2012). *How to teach vocational education: A theory of vocational pedagogy*. City and Guilds Centre for Skills Development.

Mba, P.E. & Azubike, C. (2015). Towards qualitative teaching of vocational subjects in secondary schools in Nigeria. *International Letters of Social and Humanistic Sciences, 53*, 94-100.

Mirza S. (2012) Data mining approach for predicting student performance. *Economic Review*, 2012 - academia.edu

Nasir, A. N. M. (2016). *A framework of Teaching Methods for Practical Subject in Technology Electronics Program in Vocational Colleges*. PhD Thesis. Fakulti Pendidikan, Universiti Teknologi Malaysia

Nasir, A.N.M. et al. (2020). Teachers' practical teaching methods for electronics course in vocational colleges. *Journal of Technical Education and Training, 12*(1), 189-196.

Noga, H. (2014). Applying chosen teaching methods in technical education. *IJEP, 4*(4), 23-26.

Offiong, A. A. (2010). Instructional approaches, student's characteristics and academic performance in livestock production in secondary schools in Akwa Ibom State. *Unpublished Ph. D Thesis*, University of Uyo.

Ogu, N. K. (2010). Assessment practices and students' knowledge profiles in a problem-based curriculum. *Learning Environments Research Journal*, 2, 191-213.

Okon, E. E. & Ibanga, J. (2010).*A Handbook on teacher preparation and classroom teaching*. Calabar: PAICO Press and Books Limited.

Okuta, S. & Yyock, E.S. (n.d.). The 21st century strategies for teaching in technical vocational education and training (TVET). *Journal of Association of Vocational and Technical Educators of Nigeria*. Retrieved 20th July 2022, from https://avten.edu.org.ng.

Patwa, A. (2019). What are technical vocational subjects? Retrieved 25th July 2022, from https://www.career360.com.

Rustamov, K.J. et al. (2021). Innovative approaches and methods in teaching technical subjects. *Turkish Journal of Computer and Mathematics Education, 12*(5), 1861-1866.

Sarki, R., Jah, R. K. D. & Nankumah, D. A. (2014). Vocational education: Key to national development. *Gombe Technical Education Journal, 8*(2), 137-143.

Scribd, O. N. (2010). Correlates of teachers' attritional tendencies in Cross River school system. *West African Journal of Educational Research,* 4(1): 14 – 18.

Snevana, S.T. (2014). Current trends in the methodology of teaching technical subjects. *Indian Journal of Applied Science, 4*(2), 1-3.

UNESCO/ILO (2002). Technical and vocational education and training for the 21st century. UNESCO/ILO Publication.

Wiekenberg, U. (2014). Modern training and teaching methods. Retrieved 20th July 2022, from https://tvereform.org.pk.