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POWERED VEGETABLE DEHYDRATOR ON UNDERGRADUATE STUDENTS' RETENTION IN WELDING AND SHEET METAL FABRICATION

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ABSTRACT RESEARCH ARTICLE

The study was to determine the effects of a vegetable Powered Dehydrator on undergraduate Students" retention in Welding and Fabrication and Mechanical Drawing in North Central States Nigeria. The study was guided by one objective, one research question and one hypothesis. Literature related to the study were reviewed. The study adopted quasi-experimental design which consisted of two groups (control and experimental), which involved pre-test and post-test of selected samples for the study. A total of 63 undergraduate students drawn from Federal University of Technology Minna; University of Jos and Benue State University were used as the population for the study of this number, 17 respondents were used as control and 16 as experimental group respectively. Two instruments (welding and Sheet Metal Fabrication Retention Test (WSFAT) and Mechanical Drawing Achievement Test (MDAT) containing 30 multiple choice items put together were used for date collection. Each of the instruments consisted of four option; A- D covering the content area of Welding Processes, Fabrication Processes and Mechanical Drawing respectively. The test items were develop based on the content of Metal work Technology and Mechanical Drawing courses from the University Undergraduate curriculum. The data collection instruments were validated for face and content appropriateness by three experts in Metal work Technology (Two from Abubakar Tafawa Balewa University Bauchi and one from Modibbo Adama University of Technology Yola. After retirement of the final version of the test instrument were pilot-tested an a ample of 10 Metal work Students from Abubakar Tafawa Balewa Bauchi which was outside the study area; The test, re-test methods were used to establish reliability of the instrument whose analysis yielded a reliability coefficient of 0.70, 0.73 and 0.7, 0.74 for the two rounds of testing. Data for the study was collected by the researcher with the help of three research assistance and were analyzed using SPSS version 23. Mean and standard deviation were the statistical tools used in answering the research question while t-test for independent sample used for testing the hypothesis at 0.05 level of significance. The result showed that the use of vegetable Dehydrator to teach had positive effect on undergraduate students" Retention in Welding and Sheet Metal Fabrication and Mechanical Drawing with a mean gain of 1.58, 0.41.The mean gain of those of those taught using the vegetable Powered Dehydrator was -0.88 as against those taught using lecture method was - 0.94. The difference in Retention between those Students taught Welding and Sheet Metal Fabrication and Mechanical Drawing using the vegetable Dehydrator and those students taught Welding and Sheet Metal Fabrication an d Mechanical Drawing using Lecture Method (LM) was fond to ne significant at 0.05 level of significance. Based on the findings of the study, the researcher recommended that Universities and especially Technical, Vocational, Education and Training (TVET) teacher of Welding and Sheet Metal Fabrication and Mechanical Drawing should be encouraged to always get involved in searching Local Material for teaching Welding and Sheet Metal; Fabrication and Mechanical Drawing in their institutions in the dearth of needed materials for practical projects in North Central States Nigeria.

KEYWORDS: Briquette, Dehydrator, Retention, Welding, Sheet Metal, Fabrication

INTRODUCTION

Education is a major tool for individual empowerment and National development. A National educational system is vital because it produces the personnel that are required to function in various facets of national life and development process. Pernault and Albert (2017), noted that the goals of wealth creation, employment, generation, poverty reduction and value reorientation can be effectively pursued, attained and sustained only through an efficient, relevant and functional education system. Education has been accorded a high rating in Nigeria, and the demand for education is popular because of the desire of members of the society to give their children a better chance in life. The demand for education has become necessary and one, which no government can afford to ignore. Education in Nigeria has reached a cross-road that demand a change in direction, a change in our understanding and acceptance of what educational standard and quality are, the high demand of education in Nigeria gives rise to the expansion of education.

Education is a fundamental human right as enshrined by United Nations and the need to provide quality education among youth and the need to provide them with necessary skills for increased economic productivity has been of great concern world – wide, (Onasanya and Omesewo, (2013). Taneja (2014) says education is the deliberate and systematic influence exerted by the matured person on the immature through instruction and discipline. The essential elements in the education process are a creative mind, a well- integrated self, useful purpose and experiences related to the interest, need and abilities of the individual.

The teacher‟s role in the learning process is changing as new technologies are introduced into the classroom, Sayer, (2012). The increased awareness of the role of teachers makes the development of teacher education programme an important component of an industry (UNESCO 2005). The quality of teaching is a crucial factor in promoting effective learning in schools. Effective teaching requires individuals who are academically able and care about the wellbeing of children. In every instructional setting, a teacher may be confronted by students with varied learning problems, and topics that require many hours of preparation and a limited amount of resources. Strobel and Van Baernevell, (2013) states that an effective teacher must possess the skills of a detective in an instruction setting, to overcome such obstacles, a teacher must use observation, knowledge and skills to create instructional treatment that goes beyond simple memorization of facts to create new level of understanding within the learners.

The increase in the percentage of what is learned and remembered is greatly influenced by the judicious use of instructional materials to task the various sense organs of the learners. Instructional material is one of the primary tools in the hands of the teacher for effective teaching in the classroom. Its importance is demonstrated in the popular adage that when we hear alone in the class, we forget much of what we heard, while when we hear and see we forget much less and recognize better, but whenever we hear, see and do, the rate of forgetting is significantly lowered Olawale (2013), advised that the modern day teachers should not attempt teaching without a careful selection and use of instructional materials. Olaitan and Aguisiobo (2011) considered instructional materials as any device or pieces of equipment, graphics representation and illustration designed and used to help learners learn meaningfully. Students (e. g. Metalwork students) study hard because they are internally motivated to obtain high standards in their study, while other students study hard because they want to make good grades or avoid parental disapproval. Students learn when their thoughts and expectations interact with materials, ideas, and people; such interactions gives learners meaningful developmental learning experience. Improvised instructional materials give teachers/students the pride of using their talents, allows a teacher to reproduce his/her potentials, in concrete

form and increase teacher„s knowledge of the subject matter. The use of instructional material in teaching could extend the scope and power of instruction. It could also help to bridge the gap between the teacher and students in terms of understanding different concepts in the lesson, thereby making learning more immediate and more relevant. Metalwork is unique given its orientation. It emphasizes the cognitive, affective and psychomotor skills domains. It fosters the development of spontaneity, self-reliance, flexibility of mind, critical thinking, tolerance, initiative, ability to solve problems, creativity and a sense of purpose and direction in life. Metalwork is seen as a problem-solving discipline (Obeka, 2013). Metalwork technology, is a skills-based study; its purpose is to develop educational skills and to be used to solve societal problems at all times. It seeks to replace irrelevant learning experiences with relevant ones. It places emphasis on the objectives to be achieved in the course of teaching. It is concerned with the knowledge of how human is influenced by his/her environment and how he/she in turn alters his/her environment to satisfy individual and group needs, how human is attempting to deal with certain pertinent questions, issues and problems and how he/she draws upon his/her experiences to plan for the future.

The information explosion has forged a new dynamic role for the teachers to engage fully in creative thinking. Creating a learning environment where constructing and sharing knowledge, skills and understanding are valued and a goal that every teacher must strive to reach. Therefore, the use of appropriate instructional materials is a ticket to success in the classroom. Today, the world is changing rapidly; teachers must venture on their own creative thinking in building a life-long mastery with technology. Teachers must develop their potential abilities to defeat the accompanying challenges. The need for new techniques in teaching and learning will continue to grow stronger and faster. This is most specially required of TVET teachers, since their programmes are 70% practical in nature, and so this requires hands-on training using appropriate instructional materials to enhance students‟ achievements.

Welding and Sheet Metalwork Fabrication is an aspect of Metalwork which is expected to equip learners (students) with salable skills and knowledge for paid or self-employment on graduation. Few of these trades are; Welding and Sheet Metal Fabrication, Forge Welding, Atomic welding, Submerged welding, Tungsten Inert Gas welding (TIG). Welding and sheet Metal Fabrication is the practices of using various welding skills and knowledge to create objects and or devices of different kinds, for example, petrol tanks, water storage facilities, boiler tanks, dehydrators etc. This mechanical trade therefore is central to engineering and technology of production or manufacturing in this generation. Its values therefore in the line of technical trades need not overemphasized. Therefore producing anything that would aid the teaching and learning of welding and sheet metal fabrication will no doubt be a value addition to the teaching and learning of Metalwork. Educational materials in teaching according to Nwagbo (2016) help to increase learners‟ motivation, recall earlier learning, activate learner„s response, give speedy feedback and encourage appropriate practice. Educational resource materials store lessons that can be matched to the learner„s characteristics, contents, objectives, instructional approach and evaluation techniques as well as principles of learning. Instructional materials are essential aid to effective instruction but are not commonly found in contemporary schools in Nigeria due to: i). High cost of production; ii). Faulty development of curriculum-rushed coverage of syllabus; and iii). Teachers‟ reluctance to spend their time, effort and money on improvisation. In view of the above, this study was embarked upon in order to stimulate teachers to search for creative ways to challenge student„s mind into action while studying welding and sheet metal fabrication work. This can be done by encouraging and supplying teachers with the necessary materials needed to improvise, because North Central States of Nigeria is one of the geopolitical areas that rely much on agriculture, particularly fruit and vegetables; in most of these states, most farm produce waste away during harvest, hence

the need for the construction of dehydrator for dehydrating the farm products for economic reasons, and to reduce wastage and ease out transportation.

In order to sustain the economy of Nigeria, there is need for the curriculum of Nigerian tertiary institutions, specifically university undergraduate students of Technical Vocational Education and Training (TVET) with particular reference to Welding and Sheet Metal Fabrication and Mechanical Drawing. This will enhance skill production among students and to give the entrepreneurial background hence the need for this study.

Statement of the problem

One of the major problems facing Technology Education in the Nigerian society today is the relative decline in academic achievement and students‟ and teachers‟ or lecturers‟ lack of interest in practical activities especially in higher institutions of learning. The academic achievement of students in technical and vocational education have been on the decline and not being able to reach the desired goals and objectives of being self-reliant. Most research on Technical Education (Yalams, 2014, Maaji, 2015, Atsumbe, 2016 and Ogwo, 2017) have all reported poor students achievement in welding, fabrication and sheet metal work; some of the factors responsible for this low achievement according to them include: lack of tools and equipment for welding and fabrication, lack of fund to purchase consumable materials for students‟ practical, lack of innovativeness of lecturers to harness local materials and other wastes that could be recycled to make the environment green or sustainable. Other contributing factors to poor achievements and retention in welding and sheet metal fabrication include lack of facilities for imparting practical skills, inadequate workshop equipment, lack of teachers‟ and students‟ zeal to improvise and make use of material in the absence of standard materials, lack of students‟ exposure to practical and insufficient time devoted to practical activities, lack of interest and creativity on the part of lecturers and students, adopting poor teaching methods/strategies, and the use of unskilled technologist in teaching practical works. Folorunso (2013) also reported that most tertiary institutions‟ lecturers do not seem to encourage their students in problem solving approach such as posing some challenges to the students and asking them to solve them so that it can be source of solutions to the challenges. Thus he stressed that problem/project- based learning approach be used as teaching strategies in technical education.

Yaduma (2014) in a paper termed “Technology education through problem/project based learning (PBL)” is of the view that Metalwork, Woodwork, Electrical/Electronic Technology and Building stand out distinctly and to be taught and learnt among TVET subjects by making use of available instructional materials to enhance skills development and encourage students participation in solving problems through practical. Yaduma (2010) had earlier stressed that collection of pictures and charts alone and the use of demonstration cannot give room for active participation of students, and thus does not contribute in helping them to develop their creative skills. The transfer of knowledge and skills from school to real life situations, and to the development of decision making skills and values cannot be nurtured though conventional chalk and board nor can it be effective through the traditional laboratory/workshop but by the use of more interactive strategies that can facilitate learning and independent enquiry. Welding and sheet metal fabrication in tertiary institutions is developing rapidly with new techniques now than before where the use of lecture and text books with little practical was used as a sole source of knowledge should give way to newer techniques that require the students involvement using locally sourced materials where the students will produce concrete objects that could solve their problems thereby creating the entrepreneurial spirit in them. This study therefore determined the effects of a vegetable dehydrator using locally sourced materials from the local environment, used it to teach some concepts in Welding and Sheet Metal work, some

concepts in mechanical drawing, on student‟s achievement in Tertiary institutions in North Central States of Nigeria.

Objectives of the study

The objectives of the study was to construct a vegetable dehydrator that can use briquettes as its source of power, establish its efficacy in dehydrating vegetables and other food products, and then determine its effects on undergraduate students‟ achievement and retention in Welding, Sheet Metal Fabrication and Mechanical Drawing in North Central states, Nigeria. Specifically, the study set out to:
Determine students‟ memory retention in Welding, Sheet metal Fabrication and Mechanical Drawing when taught using the constructed dehydrator and the lecture methods.

Research questions

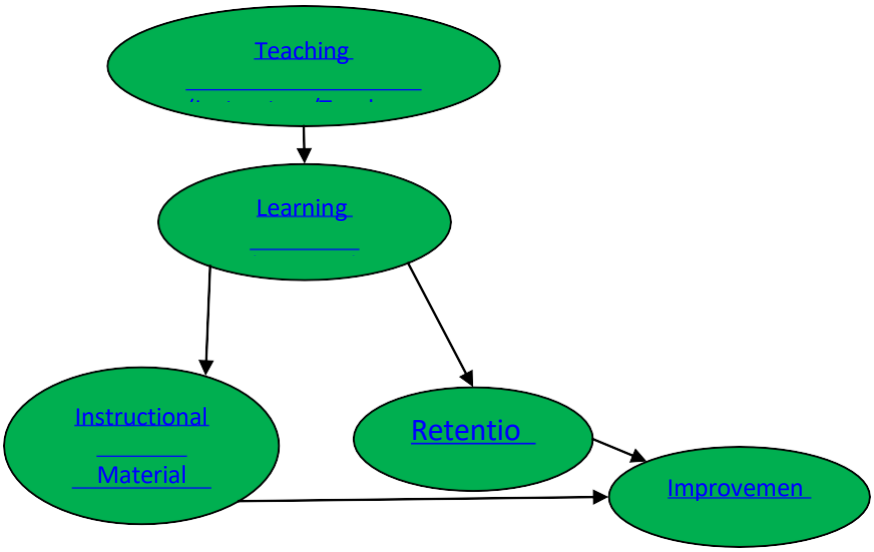
What are the mean and standard deviation retention scores of students in Welding, Sheet Metal Fabrication and Mechanical Drawing when taught using the constructed dehydrator and the lecture methods?

Hypotheses

HO: There is no significant difference in the mean retention of students taught Welding, Sheet Metal Fabrication and Mechanical Drawing when taught with Briquette Power Vegetable Dehydrator (BRIPVEGD) and those taught without a Briquette Powered Dehydrator.

Conceptual framework

The study was based on the conceptual framework drawn from the independent (Fabricated Dehydrator) and a dependent variable (Retention). The independent variable is the treatment technique used in the study in which the researcher used to manipulate to determine the relative effectiveness on the dependent variable which is retention.



Independent Variable **Dependent Variable**

Retention:

This is the process which governs how well the use of the object (constructed dehydrator) is converted and stared cognitively by undergraduate students.

Learning occurs in the use of the object (to constructed dehydrator in two phases, i.e. acquisition and performance. Acquisition is the first stage in which action of the object (dehydrator) is initially acquired by the undergraduate students. The undergraduate students acquire images and representation of the dehydrator, behavior which is then stared in their memory. However, a theorist, Bandura states that acquisition is dependent on three conditions as follows:

(a) Characteristic of the object (model). The more the similarity of the object (model) the more the object and the more imitation occurs.

(b) Learners characteristics: they could possess the following characteristics: personality attributes, anxiety, uncertainty, perceptual capacities as well as cognitive abilities

(c) Characteristic of object presentation. Object presented could be new, unique, desirable or not, likeable or aggressive; they are factors presented to the learners, when an object is frequently presented, learners have better chances to react in similar way like that of the model. In the case of constructing Briquette powered Dehydrator, undergraduate students of Welding and Sheet Metal Fabrication and Mechanical Drawing of North Central states of Nigerian will have to perform as done by the researcher in similar way.

However, presenting the Constructed briquette powered dehydrator may be one of the most effective strategies for determining undergraduate student‟s achievement and retention in welding and Sheet Metal fabrication and Mechanical Drawing.

Materials and Methods Research Design

The study adopted the Research and Development (R and D) and the quasi-experimental designs to accomplish the objectives of this study. Research and Development according to Gall, Gall and Borg (2007) is an industry based development mode in which the finding of the research are used to design new products and procedures which are systematically field tested to meet specified criteria of effectiveness and quality of similar standards. R and D is used in this study because the constructed dehydrator is technology driven and is directed towards developing a product to meet an unmet needs. It provides a platform for creativity and innovations generally in individuals. On the other hand, quasi-experiment design according to Gall and Borg (2007) involves the use of pre-test and post-test with experiment and control groups. Quasi experimental designs can be used when it is not possible for the researcher to randomly sample the subject and assign them to treatment groups without disrupting the academic programme of the Universities involved in the study Gall and Borg (2007). The type of quasi-experimental design that was used was the non-equivalent control group, which involved two groups as expressed in a schematic diagram as shown.

Material Selection

The selection of a proper material for construction purposes was one of the most difficult problems for the researcher. The best material is one which serves the desired objectives at the minimum cost. The following factors were considered in the selection of materials for the construction of the detachable dehydrator:

i. Availability of materials

ii. Sustainability of materials for the working conditions in service

iii. Cost of the material

The material selected for the construction of the detachable briquette powered vegetable dehydrator was galvanized Sheet Metal Steel because this material is corrosion resistance. Other major materials were angular iron, wire mesh and flat bars. These steels are of lower carbon for it to be easily welded and its susceptibility to inter-granular corrosion (Askeland, Fulay and Wright 2010). The thickness of the galvanized sheet (SWG 20) was 0.5 mm and has very good drawability which permits successful forming of complex shapes. These metallic materials (galvanized sheets wire mesh angular iron, flat bars) exhibit an excellent resistance to a wide range of atmospheric and chemical exposures. The wire mesh are the surface on which the vegetables are to be spread to be dehydrated, while the flat bars were welded across the mesh to give it rigidity. The wire mesh is made of steels. Most dehydrators use steel as these contain much iron. Iron and iron deficiency particularly is an important issue for pregnant women and young children. The longer and hotter the dehydrating temperature the more iron is infused into the food; hence wire-mesh which contains iron was selected.

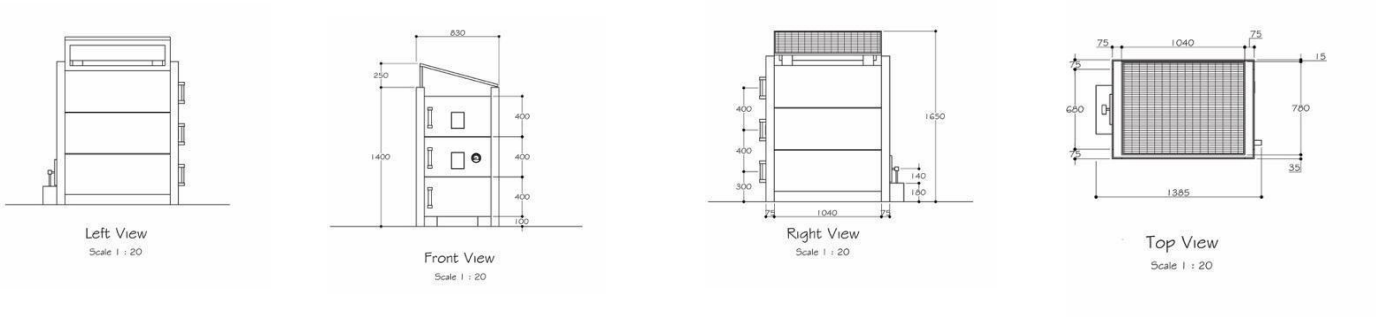
Briquette selection

The source of fuel selected to power the device was briquettes, these include: Rice husk, waste charcoal and groundnut shell ash. The reasons for experimenting on these waste products was because most farmers discard them everywhere polluting the environment, there was the need therefore to turn waste to wealth. The selected material were burnt which had little or no soot and are environmentally friendly; they provide complete burning; the heat generated was uniform, save time, energy and cost.

The three major materials were carefully sorted manually to remove impurities such as pieces of wood, bones, stones and other unwanted materials. They are later air-dried to further remove moisture content (up to 90% dryness). Each of the materials (Rice husk, groundnut shell and charcoal waste) were burnt in an enclosed container (empty drum) to avoid air pollution and the environment. Small cassava powder was acquired (starch) as a binding agent, while water was boiled to about 70 to 80oC and each of the raw materials (rice husk ash, waste charcoal ash and groundnut shell ash) were mixed with the binding agent equally to form slurry.

The mixtures were fed into the constructed mold one after the other and compressed and exposed to natural air for twenty four hours. The samples were used to dehydrate samples of tomatoes, eggs meat and. Carrots.

Views of the dehydrator



Rice Husk Charcoal Groundnut shell Completed briquette

Raw Materials of Briquettes

Instrument for Data Collection

The following instruments were developed for data collection, Welding and Sheet Metal Fabrication Achievement Test (WSFAT) and Mechanical Drawing Achievement Test (MDAT). The two test (WSFAT and MDAT) a-30 multiple choice items were developed from the content area of the course DTM 412 and DTM 410 as contained in the University curriculum. The instrument covers the content areas of the topics selected for the study. These instruments were developed by the researcher and validated by experts in the Department of Technical, Vocational Education and Training of Abubakar Tafawa Balewa University Bauchi and Modibbo University of Technology Yola. These instruments were used to test the students‟ achievement and retention in welding and sheet metal fabrication and mechanical drawing.

In constructing the WSFAT and MDAT a table of specification and the test blue print were developed and used to guide the development of the test items. The construction of the test blue print was done in conjunction with the guidelines of the University undergraduate degree programme course handbook for final year students. The content determined the number of test items on Welding and Sheet metal Fabrication and Mechanical Drawing degree programme. The final blue print containing units of these concepts taught and the corresponding learning outcome of the test used to determine students achievement and retention in Welding and Sheet Metal Fabrication and Mechanical Drawing in North Central States of Nigeria. The number of

test items reflected the psychomotor domains of undergraduate students‟ ability to observe, imitate, practice and adapt.

The table of specification used for the Welding and Sheet Metal Fabrication and Mechanical DrawingAchievement Test (WSFAT and MDAT).

Topics	Observing	Imitating	Practicing	Adapting	Total
Welding	2	3	3	2	10
Fabricating	3	2	2	3	10
Drawing	2	3	3	2	10
Total	7	8	8	7	30

Based on this, the test items were recognized in line with the distribution of the items in terms of content area, objective level and proportion of the table of specification.

Research Question

What are the mean and standard deviation retention scores of students in Welding, Sheet metal Fabrication and Mechanical drawing when taught using the constructed dehydrator and the lecture methods?

The mean and standard deviation retention scores of undergraduate students taught Welding, Sheet Metal Fabrication and Mechanical Drawing using Vegetable Dehydrator (VD) compared to those taught using Lecture Method (LM).

Group	**N**	**Post-Test Mean**	**SD**	**Retention Mean**	**SD**	**MeanGain**
VD	16	21.38	1.41	20.50	1.46	-0.88
LM	17	13.88	1.58	12.94	1.82	-0.94

The mean and standard deviation retention scores of undergraduate students taught Welding, Sheet Metal Fabrication and Mechanical Drawing using Vegetable Dehydrator (VD) and Lecture Method (LM). From the result, the mean and standard deviation of post- test retention scores of the VD were 21.38 ± 1.41 and 20.50 ± 1.46 respectively, this gives a mean gain score of – 0.88, these shows that there was lost in retention after the post-test. Similarly, the mean and standard deviation of the post-test and retention scores of the Lecture Method (LM) were 13.88± 1.58 and 12.94± 1.82 respectively. The experimental group had a retention memory higher than their counterpart in the control group with a mean gain of 0.14. This result indicated that the experimental group retained the concept of Welding, Sheet Metal Fabrication and Mechanical Drawing better than those taught under the Lecture Method (LM).

There is no significant difference in the mean retention scores of undergraduate students taught WSMF and D using VD and those taught using the LM.

Independent Sample Test Result of the Mean Retention Scores of Undergraduate Students Taught WSMF and D using VD and the LM.

An independent sample t – test was conducted to compare the Retention scores of undergraduate students‟ taught WSMF and MD using VD compared to those taught using the LM. There was a significant difference in the scores for VD (20.50± 1.46) and LM

(12.94± 1.82); t (31) = 13.11, p = .000 two tailed. Themagnitude of the differences in the means (mean difference = 7.56.95% CI: 6.38 to 8.73) was very large (etasquared = 0.847). Hence the null hypothesis was rejected.

Findings of the Study.

Research question sought the mean and standard deviation retention scores of students in Welding, Sheet Metal Fabrication and Mechanical Drawing when taught using the constructed dehydrator as an instructional material and also taught sing the lecture method. Findings of this research question revealed that the experimental group had a retention memory higher than their counterparts in the control group witha mean gain of 0.14. This shows that the experimental group retained the content taught much more than the control group.

Conclusion

Based on the findings of the study it was concluded that the Briquette vegetable dehydrator as an instructional material had positive effects on undergraduate students‟ retention in teaching welding and sheet metal fabrication and mechanical drawing the North Central States Nigeria. A part from the dehydrator being used for dehydrating food items, it was constructed as an instructional material and used for the teaching of Welding and Sheet Metal Fabrication and Mechanical Drawing. Besides, the unit could be used to challenge TVET students into producing such device for entrepreneurial purposes.

The tests administered using the Vegetable Dehydrator as an instructional material has proved that students could performed; retained and achieve better evident from the findings of the study. It is ascertained that when teachers use instructional materials; better results in terms of retention is achieved.

References

1. Adimgt, I, (2015), Improvisation of Instructional materials for effective teaching and l earning of mathematics. Asabar, The educator (1) 166-171.
2. Akinbobola, A.O. (2012) Comparative effects of the improvised and standard equipment of students‟ achievement in Senior Secondary School Physics. In Etuk, N.E; Udohot, I.M and Udosen, A.E (eds) Education in Nigeria in the 21st Century: Focus and Imperatives Uyo Aba‟am Publishers co
3. Askeland, J, Fulley, S and Wright, T. (2010) Solar dryer with thermal energy for drying Agricultural food product. A review 14 (8) 2298-2314 .
4. Atsumbe, B.A. (2016) Effect of recorded videotaped Instructional Strategy on Academic Achievement and retention of Auto-mechanic Students. Unpublished PhD thesis. Department of Vocational Teacher Education UNN
5. Down, D. and Ahmadu I. (2014). Science, Technology and Mathematics Education as potent tool for National Development ZUBA Journal of Science and Education 1 (1)
6. Folorunso, B. (2013). Selection and Use of Instructional Materials and resources. Basic Education Teacher‟s Handbook of Nigerian Educational Research and Development Council. 176-182
7. Gall, M.D. Gall, J.P. and Borg, W.R. (2007). Education Research 5th Edition. New

York: USA.

8. Ioil, E. (2012) Poverty, Education and Strategies for handling Youth problems. The belt Journal of education in Nigeria Vol 3 No 4 Bel-Jen.

9. Ma‟aji S.A (2015). Effect of Integrative Application of Interaction pattern on Students‟ cognitive Achievement in Basic Electricity. Retrieved from http;//iis-olh Standfort June 2017.

10. Nwagbo, C.R. (2016). Effects of Two Teaching Methods on Achievement and attitude in Biology of Students of different levels of scientific literacy. International journal of educational Research 216- 229 www. Elsevier.com/locate/ijolures. Retrieved 13-2-2018

11. Obeka, S.S (2013). Effects of Practical work on Student‟s Achievement in some environmental Education concepts of Senior Secondary School Geography. Unpublished M.Ed Thesis. University of Nigeria Nsukka.

12. Ogwo, B. (2017). A Rational Study of Students Achievement of Television Technology in

a. Technical Colleges in Delta State of Nigeria. Journal of Industrial Teacher Education 43

13. Ohuvi, L. (2012). Professional skills for effective teaching – Appraisal of basic issues in education foundation

14. Oladele, A. and Lasisi B. (2016). The relative effect of metal cognitive strategy of training on students Achievement in selected chemistry concepts. Journal of science Teachers Association of Nigeria B7 (1 and 2) 20-28

15. Olaitan, S.O. and Aguisiobo O.N. (2011) Teaching of Clothing and Textile New York,

John

a. Willey and Sons Publishers.

16. Olawale, S.K. (2013). The use of Instructional Materials for effective teaching of Islamic Studies. Jihat Oil Islam 6, (20, 29-40. Retrieved on December 7th 2017 from http://pu.pk/images/journal/jihat- ut-ul-Islam/pdf

17. Onasanga, B.I. and Omosewo, (2013). Effects of using Standard Instructional Materials and Improvised Instructional Materials in Secondary School Students‟ Academic Performance in Physics in Illorin Nigeria- http:// www.lad.org/sds/doc/ educational technology 2, Retrieved 7-6-2018

18. Perrault, E.K and Albert, C.A (2017). Utilizing Project Based Learning to increase sustainability attitudes among students “Applied Environmental Education and Communication 0 (0) 1-10 doi 10.80/ 15330115x1366882. ISSN 1533-015x

19. Sawyer, R.K. (2012). The Cambridge handbook of Learning Sciences. New York: The Cambridge University Press)

20. Strobel J. Van Barneveld, and Angela (2013). When is PBL more effective? A meta-synthesis of Meta-analysis comparing PBL to conventional classroom” Interdisciplinary Journal of Problem – based learning 3 (1) dol/19.777/1541-5015.1046

21. Taneja, I. (2014) Developing and underdevelopment on Education; Ibadan: University Press a. Ltd.

22. Tloses, I. (2015) Causes of poor achievement in NABTEB Examination in Taraba State Secondary Schools. International Journal of Science and Technology 21 (3) 11-17

23. Uban, O. (2015) Effect of Laboratory method on students Achievement and Retention in Senior Secondary Schools Biology in Kogi State. Journal of Research and Method

in Education (JOSR – JRME) 6 (1) 31-39
24. Ubane F. (2017) Effect of recorded video tapped instructional strategy on Academic Achievement and retention of Electrical students unpublished PhD thesis submitted to the Department of vocational Teacher Education UNN
25. Yaduma, P.S (2010) Measurement Models for Factors influencing Academic Achievements
a. and completion of tertiary studies.
26. Yaduma, P.S (2014) Problem based learning in Higher education. Untold Stories. Backingham.
a. Society for Research in Higher Education.
27. Yalams S.M. (2016).TVET and local content Development for sustainable Industrialization in Nigeria. A lead paper presented at National Association of Teachers of Technology (NATT) Conference. Minna
28. Yalams, S.M. (2014). Image and Students achievement towards Technical and Vocational
29. Education and Training (TVET) Journal of Technical Education and Training 3 (1)
References
1. 1. Adegite (2010) Reinventing governmental accounting for accountability assurance in Nigeria. Nigerian Research Journal of Accounting 1(1):1-16. Adegite EO (2010). Accounting, accountability and national development. Nigerian Accounting 43(1):56-64.
2. Ademola OA, Adegoke AK, Oyeleye AO (2017). Impact of international public sector accounting standards (IPSAS) adoption on financial accountability in selected local governments of Oyo State, Nigeria. Asian Journal of Economics Business and Accounting 3(2):1-9.
3. Babatunde SA (2017). Implementing international public sector accounting standards in Nigeria: issues and challenges. International Journal of Business Economics and Law 12(1):52-61.
4. Chen MC (2012). The Influence of workplace spirituality on motivations for earnings management: A Study in Taiwan's hospitality industry. Journal of Hospitality Management and Tourism 3(1):1-11.
5. Ijeoma NB, Oghoghomeh GN (2014). Adoption of IPSAS in Nigeria: expectations, benefits and challenges, problems. Journal of Investment and Management 3(1):21-29. International Federation of Accountants (IFAC) (2012). Public sector financial management transparency and accountability: The use of international public sector accounting standards. IFAC Policy Position 4:1-6. Availableat:https://www.ifac.org/system/files/publications/files/Policy%20Position%20Paper%20 4%20For%2 0Issue.pdf International Federation of
6. Accountants (IFAC) (2014). The Conceptual Framework for General Purpose Financial Reporting by Public Sector Atuilik and Salia 109 Entities. Available at: https://www.ifac.org/publications- resources/conceptual-frameworkgeneral-purpose-financial-reporting-public-sector-enti-8
7. International Federation of Accountants (IFAC) (2017). Accrual Practices and Reform Expectations in the Caribbean. Public Sector Financial Accountability Survey Findings. Available at: http://www.ifac.org/publications
8. Johnson (1993) Theory of the firm: Managerial behavior, agency costs and ownership structure. Journal of Financial Economics 3(4):305-360.
9. Murphy R, Sagar P (2009). What is financial transparency? Mapping the Faultlines series, tax justice network. Available at:

http://www.secrecyjurisdictions.com/PDF/FinancialTransparency.pdf
10. Murphy, (2000) Implementing Public Policy: Governance in Theory and Practice. London: Sage.
11. Ofoegbu GN (2014). New public management and accrual accounting basis for transparency and accountability in the Nigerian public sector. IOSR Journal of Business and Management 16(7):104- 113.
12. Rizvi (2007) Governance, the State and the politics of development. Development and Change 25(2):363-386.
13. Rondinelli (2007) International public sector accounting standards implementation in the Russian Federation. International Journal of Economics and Financial Issues 6(4):1304- 1309.