Assessment of Task, Activities and Working Materials Used in Non-Formal Training of Solar and Satellite System Installation in Niger State

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Abstract: The study was designed to assess the tasks, activities and workings materials in the non-formal training of craft man in solar and satellite systems installation in Niger State of Nigeria. Descriptive survey research method was adopted. The population for the study comprised of 243 trainees and 99 master trainers. For this study, the entire population of the trainee and the master trainers was used; hence, sampling was not carried out. The research instrument used in this study was a structured questionnaire, and it involved the use of a Likert scale. The instrument was validated by experts in the Department of Industrial and Technology Education, Federal University of Technology, Minna. Cronbach Alpha co-efficient was used to determine the internal consistency of the instrument and it yielded reliability coefficient of 0.99. Data were collected through questionnaire with the help of six research assistants. SPSS was used to perform analysis of the data. Mean and standard deviation was used to evaluate research questions, while z test was used to test the hypotheses at 0.05 level of significance. The findings from the hypothesis of the study revealed that that there is no significant difference between the mean responses of trainers and trainee on tasks in non-formal training of solar system installation with a the mean and standard deviation of trainer are 3.55 and 0.70 while the mean and standard deviation of trainee are 3.39 and 0.73 respectively, since the p-value (0.52) is greater than 0.05. The study concluded that the need for training of trainee in the working environment and the participation of master trainers in the structuring of the apprenticeship learning to learn comprehensively. The study recommends that master trainers should be appropriate in planning tasks in non-formal training of trainees in solar system installation. The government should provide working materials for trainers and trainee in non-formal training of solar and satellite system installation.

Keywords: Assessment, Nigeria, Non-formal training, Solar, Satellite

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1. Introduction

Non-formal learning refers to a variety of structured learning situations that do not have the same level of curriculum, syllabus, accreditation, or certification as 'formal learning,' but are more structured than 'informal learning,' which occurs naturally and spontaneously as part of other activities. The Organisation for Economic Co-operation and Development recognizes and supports these three learning styles (OECD, 2018). Skilled training, according to the World Bank (2014), is the process of improving an individual's or a group's ability to make decisions and translate those decisions into desired actions and outcomes. Susan (2014) defined skillful training as the process of enabling or authorizing an individual to think, act, and make decisions independently. In the context of this study, training empowerment refers to the process of providing an individual with abilities that enable them to earn a living. Non-formal education is now viewed as a means of achieving ongoing and lifetime learning.

Non-formal training, according to the OECD (2018), is training that takes place outside of the formal education system. It encompasses a variety of structured training that does not have the same level of curriculum, syllabus, accreditation, or certification as 'formal learning,' but is more structured than 'informal learning,' which occurs organically and spontaneously as part of other activities. Trainee programs are typically a mix of theory and practice, with the goal of allowing the trainee to learn the organization from the ground up. Numerous trainees are able to use their trainee network to go up the corporate ladder and become prominent figures in many firms. After completing his apprenticeship, a trainee would become a journeyman looking for a spot to open his own shop and earn a living. He might then call himself a Trainee master after establishing his own shop (Okorie, 2014). Trainees are educated in a variety of skills, including car mechanics, woodworking, metalworking, electrical installation, electronics work, construction technology, and the installation of satellite and solar systems.

The conversion of energy from sunshine into electricity is known as solar power. The photovoltaic effect is used to convert light into an electric current in photovoltaics. Solar tracking systems and lenses or mirrors are used in concentrated solar power systems to focus a wide region of sunlight into a narrow beam. The craftsmen also ought to carry out task of test operating voltages to ensure operation within acceptable limits for power conditioning equipment, such as inverters and controllers. Visually inspect and test photovoltaic (PV) modules or systems, Compile or maintain records of system operation, performance, and maintenance, demonstrate system functionality and performance, including start-up, shut-down, normal operation, and emergency or bypass operations and determine materials, equipment, and installation sequences necessary to maximize installation efficiency (Jones, 2017).

Limitation, repetition, and occupational participation are some other techniques of developing skill throughout the trainee time. By imitating the master, the apprentice becomes familiar with how the master does the act. Repetition is the process of doing an action multiple times in order to master it. Occupational participation entails both master imitating and regular practice. In addition, skills are acquired through the use of other projects, demonstrations, and experiences. Apprenticeship learning and training require a high level of interest. It is a motivating force based on basic emotions and desires that develops one's potentialities. It has long been recognized as one of the most important variables influencing people's professional choices (Ochiagha, 2013).

Solar and satellite installations have only lasted a few years in recent years before failing (Stephen, 2015). This could imply that the training materials are inadequate, not labor market-driven, or out of date with the quickly changing technological landscape. The operation of the informal sector apprenticeship is unorganized and lacking in theoretical knowledge, according to Okorie and Ezeji (2012), and repairs and maintenance work is done by trial and error. Furthermore, the craftsmen's trial-and-error method, as well as the non-formal training strategy of demonstration and limitation, are unsuccessful and may result in further equipment and appliance damage. As a result of a lack of sufficient training on developing technologies, the trainer involved in the installation and maintenance of solar power and TV satellite systems appears to lack the necessary technical abilities (Okorie, 2014). If this trend continues, it may result in the layoff of some self-employed trainers and trainees, as well as the inability of apprentices trained in this environment to find work. Furthermore, as the country moves forward with technological advancements aimed at increasing educational quality and skill training, a task, activity, and working materials master trainer in solar and satellite systems installation is needed to improve nonformal vocational training in Niger State.

The following null hypotheses was tested at .05 level of significance:

Ho1: There is no significant difference between the mean response of master trainer and Trainee as regard the tasks in non-formal training of solar system installation in Niger State

Ho2: There is no significant difference between the mean responses of master trainer and Trainee as regards the task in non-formal training of satellite system installation in Niger State.

2. Relevant Literatures

2.1. Theoretical Framework

Behavioural learning theory

The behavioural learning theory, sometimes known as behaviourism, is a popular notion that focuses on how pupils learn. All behaviours are taught through interaction with the environment, according to behaviourism. According to this learning theory, behaviours are acquired from their environment, and intrinsic or inherited characteristics have very little influence on behaviour. For educators, behaviourism is important because it influences how students react and behave in the classroom, and it argues that teachers can have a direct influence on how their students behave. It also helps teachers recognize how a student's home environment and lifestyle can influence their conduct, allowing them to observe it objectively and attempt to improve it (Crawl et al., 1997).

Motivation plays an important role in behavioural learning. Positive and negative reinforcement can be motivators for students. For example, a student who receives praise for a good test score is much more likely to learn the answers effectively than a student who receives no praise for a good test score. The student who receives no praise is experiencing negative reinforcement their brain tells them that though they got a good grade, it didn't really matter, so the material of the test becomes unimportant to them. Conversely students who receive positive reinforcement see a direct correlation to continuing excellence, completely based on that response to a positive stimulus.

Cognitive learning theory

Cognitive Learning Theory is a broad theory that explains thinking and differing mental processes and how they are influenced by internal and external factors in order to produce learning in individuals. When cognitive processes are working normally then acquisition and storage of knowledge works well, but when these cognitive processes are ineffective, learning delays and difficulties can be seen (Schultz & Schultz, 2004). These cognitive processes are: observing, categorizing, and forming generalizations about our environment. A disruption in these natural cognitive processes can cause behavioral problems in individuals and the key to treating these problems lies in changing the disrupted process.

Cognitive learning theory related to how a person learns and how learning can be efficient have a long history. Various theories and approaches have been developed in this field and they have had important impact on endeavors for learning. Pedagogues make a classification based on three basic approaches while dealing with learning theories (Huitt, 2012). These are behaviorist approach, cognitive approach and constructivism. It will be a mistake to see these three approaches as alternative to each one or to evaluate them independently while making a classification.

2.2. Conceptual Framework

Apprenticeship system in Nigeria

According to Pratt (2011), the Apprenticeship Perspective places the student in a real-world practice setting. Apprentices study a certain task by working side by side with an expert (Barab & Hay, 2014). Apprenticeships include: (1) the creation of learning contexts that model proficiency, (2) coaching and scaffolding as students immerse themselves in authentic activities, and (3) independent practice so that students gain an appreciation for the application of domain-related principles in a variety of contexts (Barab & Hay, 2014). Educators use apprenticeship as a teaching approach to teach pupils how to solve problems, grasp tasks, do specific activities, and deal with challenging situations (Collins et al., 2016). In conclusion, apprenticeship learning is a strategy that teachers utilize to educate students a certain task. It is used in a challenging setting to teach pupils how to react in a similar situation. Students acquire a specific skill in close collaboration with an expert. Apprenticeship training is extremely advantageous to the learner. The information gained by the student is subsequently put to use in the field of study through practical applications.

Apprenticeship, according to Osinem and Nwoji (2017), is a type of vocational training in which a person spends time with a trainer to learn a craft from his knowledge over a period of time. A well-planned and supervised apprenticeship program, according to Osinem and Nwoji (2017), will be beneficial.

1. Provide the most efficient way to train all-round craftsmen to meet present and future needs.

2. Assure an adequate supply of skilled workers to fill employment opportunities.

3. Assure the community of competent craftsmen, skilled in relevant aspect of their trades.

4. Give the individual worker a greater sense of social and economic security and fulfillment.

5. Generally raise skill levels in an organisation.

Acquisition of vocational skill through non-formal education

The growth in technology and commerce in any given society depends largely on a functional educational system that recognizes the needs, aspirations and values of the society at a given period of time. Nigeria like other developing nations of the world has been faced with economic problems like unemployment, illiteracy, anti-social vices and poverty. A call for a wholesome national development can only be attained if only when people are adequately employed in productive ventures, no matter the magnitude. For people to be employed and productive, the government will have to provide enabling environment and sustainable programme through vocational education and training.

Okoro (2006) defined technical and vocational education as that aspect of education that involves the acquisition of practical skill and basic scientific knowledge. While skill acquisition is the process of acquiring or gaining effective and ready knowledge in developing one's aptitude and ability on a particular field. Skill acquisition is one among other policies embarked on in Nigeria with the sole aim of alleviating poverty, youth restiveness, sophisticated crime, rural and urban drifts, unemployment and other social vices. The acquisition of skills by individuals in non-formal institutions is meant to equip individuals with more practical skills and less theoretical knowledge in income generating skills. Mbanusi (2008) noted that when individuals, youths and adults are given adequate training in the area of their interest, will enhance self-employment after their training in form of apprenticeship method thereby alleviating their personality as active partners in both community and national development.

Satellite system installation

Television (TV) has become a very important asset in homes. The visual images and sounds that are reproduced on television screens make it more attractive. Television is importantly used to broadcast programmes for entertainments (sports, movies, and music), information (news) and education. A television according to Titlow (2012) is a telecommunication medium for transmitting and receiving moving images that can be monochrome (black and white) or coloured with or without accompanying sound. A standard television set comprises multiple internal electronic circuits including those for receiving and decoding broadcast signals. The extent to which the television serves its users depends on the type of receiving device that receives and decodes the broadcast signals.

A television receiver is an electronic device that receives television signals transmitted from a broadcasting

station, amplifies it and applies it to the television screen. At the television receiver, the sound and picture carrier waves are picked up by the receiving antenna producing currents that are identical in form to those flowing in the transmitting antenna to the receiver by a lead- in-transmission line (Britannica, 2005). A television receiver performs the basic function of reception through its aerial system (antenna), selection, detection by converting the radio frequency signals into audio and video signal while the speaker and screen produces transmitted sounds and pictures. The sounds and picture produced are the television programmes. However, access television programme through different means such as, antenna, cables, or satellite dish. There is need to empower electronic master trainers with skills on how to install a satellite dish.

Generally, satellite kits include the satellite dish, mast, receiver, cables, and all necessary mounting hardware. Usually, installation requires the following items: Ladder; Power drill; 3/8-inch drill bit; Phillips screw bit for drill; Level; Compass; Satellite signal meter; Sealant. Satellite dishes are often installed on a roof, a balcony, or the side of a home. Satellite TV is a television programme delivered to users through a satellite and its usage has become so popular that it has become a source of income for many people. Nick (2014) defined satellite as a man-made object launched into space to orbit the earth, moon, sun, or other celestial body. Similarly, Rouse (2008) referred to satellite as a wireless receiver/transmitter that is launched by a rocket and placed in orbit around the earth. The satellite TV system transmits and receives broadcast signals using a specialized antenna called satellite dish. However, a satellite dish as defined by EBay (2013) is a signal receiver from satellite in orbit about the planet. Satellite dish sends and receives microwave signals which it converts into electric signals that can be used by computer, television and other devices (Janssen 2014). Part of the attraction to satellite dish is the great reception that results in exceptional sound and picture quality. Its higher quality digital signal is superior to the cable provider's signal that must be split and compressed to reach their subscribers. In addition, dish network offers 100% local coverage of ones favourite in addition to other top programmes for a total of over 260 channels ranging from sport packages to premium channels (Bailey, 2013). Television satellite dish has many important component parts. Among the parts of a television satellite dish are: satellite dish pan, low noise block feed horn (LNBF), receiver, decoder.

Solar system installation

Chris, (2016) state that Solar System is the gravitationally bound system of the Sun and the objects that orbit it, either directly or indirectly. Of the objects that orbit the Sun directly, the largest are the eight planets, with the remainder being smaller objects, the dwarf planets and small Solar System bodies. Of the objects that orbit the Sun indirectly the natural satellites two are larger than the smallest planet, Mercury.

The Solar System formed 4.6 billion years ago from the gravitational collapse of a giant interstellar molecular cloud. The vast majority of the system's mass is in the Sun, with the majority of the remaining mass contained in Jupiter. The four smaller inner planets, Mercury, Venus, Earth and Mars, are terrestrial planets, being primarily composed of rock and metal. The four outer planets are giant planets, being substantially more massive than the terrestrials. The two largest planets, Jupiter and Saturn, are gas giants, being composed mainly of hydrogen and helium; the two outermost planets, Uranus and Neptune, are ice giants, being composed mostly of substances with relatively high melting points compared with hydrogen and helium, called volatiles, such as water, ammonia and methane. All eight planets have almost circular orbits that lie within a nearly flat disc called the ecliptic (Chris, 2016).

The Solar System also contains smaller objects. The asteroid belt, which lies between the orbits of Mars and Jupiter, mostly contains objects composed, like the terrestrial planets, of rock and metal. Beyond Neptune's orbit lie the Kuiper belt and scattered disc, which are populations of transNeptunian objects composed mostly of ices, and beyond them a newly discovered population of sednoids. Within these populations, some objects are large enough to have rounded under their own gravity, though there is considerable debate as to how many there will prove to be. Such objects are categorized as dwarf planets. The only certain dwarf planet is Pluto, with another transNeptunian object, Eris, expected to be, and the asteroid Ceres at least close to being a dwarf planet. In addition to these two regions, various other small-body populations, including comets, centaurs and interplanetary dust clouds, freely travel between regions. Six of the planets, the six largest possible dwarf planets, and many of the smaller bodies are orbited by natural satellites, usually termed "moons" after the Moon. Each of the outer planets is encircled by planetary rings of dust and other small objects (Chris, 2016).

The solar wind, a stream of charged particles flowing outwards from the Sun, creates a bubblelike region in the interstellar medium known as the heliosphere. The heliopause is the point at which pressure from the solar wind is equal to the opposing pressure of the interstellar medium; it extends out to the edge of the scattered disc. The Oort cloud, which is thought to be the source for long-period comets, may also exist at a distance roughly a thousand times further than the heliosphere. The Solar System is located in the Orion Arm, 26,000 light-years from the center of the Milky Way galaxy.

Solar cell is made of two types of semiconductors which are called P-type and N-type silicon. Because of adding atoms, the P-type silicon loses one electron. The N-type silicon is made by adding atoms so that it gets one more electron. A solar cell is made by a P-type silicon layer and the N-type silicon layer. There are too many electrons in N-type layer, and in P-type layer, there are too many electron-holes. Near the junction of those two layers, the electron moves into the electron-hole from N-type layer, this creates a depletion zone so that the electrons fill the holes. Solar cell is a device which can catch the sun light and transform it to electrical energy

directly. The size of a solar cell is about a size of a palm of an adult. The shape is an octagon, and the color is blue-black. Solar cells are built with the solar batteries together very often. The large units are solar modules. The case of many solar cells are built together which are called a solar panel (Chris, 2016).

2.3. Review of related empirical studies

Ogbuanya et al. (2020) assess the apprenticeship system and labour supply of electrical installation artisans in Enugu State. The paper focused on apprenticeship system and labour supply. study was carried out in Enugu State of Nigeria which involved 234 apprentices of electrical installation. A structured questionnaire was used for data collection. The instrument was face-validation by three experts and pilot tested on 15 apprentices in Anambra to determine its reliability. Cronbach Alpha reliability method was used to establish the internal consistency of the instrument and it yielded the overall reliability coefficients of 0.87. After the data collection, mean, standard deviation and t-test were used to answer the research questions and null hypotheses that guided the study. The study found that 14 modalities were needed for the admittance of apprentices, 10 attraction packages were found for facilitating enrolment into apprenticeship system, 11 motivation indices were found for apprentices in electrical installation, there was no significant difference between the mean responses of early apprentices and late apprentices on the attraction of apprentices' enrolment into apprenticeship system, and on motivation indices and instructional modalities. The study related to the present study in the area of apprenticeship and electrical installation. Though it was carried out in Enugu State, South Estate of Nigeria.

Onoh, (2019) investigate electrical installation and maintenance skill needs of Technical college graduates for job creation and self-reliance in Enugu state. This study determines the electrical installation and maintenance skill needs of technical college graduates for job creation and self-reliance in Enugu State. The population for the study comprised of 33 graduates in rural and 64 graduates in urban cities of Enugu state. Due to manageable size of the population, there was no sampling. Two research questions were raised and answered using mean and standard deviation while hypotheses formulated were tested using t-test at .05 level of significance. The study adopted descriptive (survey) research design while data was collected using a structured questionnaire developed by the researcher. The instrument was validated by three experts; the reliability of the instrument was established using Cronbach Alpha which gave a high co-efficient result of 0.78. Some of the findings include: electrical installation and maintenance work skills like Planing the layout and installation of wiring, testing of electrical work for safety, Competence with tools, effectives use of materials, inspection of electrical installation, interpretation of wiring drawing and the likes are highly needed for job creation. The study relates to the present study in the area of electrical installation skills needs, though it focused on technical college graduates.

Elias, (2014) conducted a research on the factors affecting the existence of non-formal education in Kenya with focus on Kibera slum. The study establishes the state of learning conditions, forms and patterns of community participation in the management of NFE culture, socio-economic factors and the level and forms of participation by the learners on non-formal education in Kenya. The study adopted a survey research design in which all the 9,854 learners and 280 teachers in the non-formal education centres in Kibera slum were targeted. The study used stratified random sampling method to select 336 pupils from the three locations of Kibera slum. Purposive sampling was used to select 8 headteachers, 8 teachers, one District Education Officer, one County Education Officer 3 chiefs and 3 community members from the sampled centers. The researcher also interviewed the key informants. Data was collected both quantitatively and qualitatively using observation guides, questionnaires and interview schedules. The researcher self-administered the research instruments. Data was analysed using both descriptive statistics and content analysis. The study established that the community comprised of community members, parents, NGOs, churches and to a small extent the government. The participation by the community was in forms of building classrooms, buying of school furniture and land for establishment and learning materials. The study further established that most of the schools have classrooms and learners are provided with meals.

3. Materials and methods

A descriptive Survey research method was adopted. This research design was dimmed appropriate for this study because it was used to collect information from all parameters that was needed to solve the research problems. The population for the study comprised of trainees and master trainers in the six metropolitan city in Niger State. The total population of the study is eight hundred and ninety three (893) in Niger State, in which the trainees is five hundred and thirty six (536) while the master trainers is three hundred and fifty seven in the six metropolitan city in Niger State (Niger State Technician Association of Nigeria, 2020). A simple random sampling technique was used for the study. The research instrument used in this study is a structured questionnaire, and it involve the use of a Likert scale. The total reliability index of 0.99 was generated and therefore acceptable. The result showed the overall reliability of the instrument, indicate that the instrument had a high reliability, the items in the questionnaire was internally consistent in measuring what is intended to be measured for the study. Data collected for this study was analyzed by computing. Mean and standard deviation was used to answer the research questions while Z-test analysis was used to test the hypotheses at 0.05 level of significance.

This research work center on solar and satellite system installation master trainers and trainee in Niger State. The reasons for choosing the state were due to the urban nature of the towns and most of the people living in the area used solar and satellite and this makes the presence of technicians high in these areas. Data collected was restricted to trainee and the master trainee which specifically deals with solar and TV satellite systems.

Niger State is situated in the north-central geopolitical zone of Nigeria with Minna as its capital city. Other major towns in the State include Suleja, Bida, Mokwa, New Bussa and Kontagora as shown in Figure 1. Established in 1976, Niger State was created out of the defunct North-Western States. It is the largest State in Nigeria with a vast land mass of 86,000km2; approximately 8.6 million hectares constituting about 9.3% of the total land area of the country. Therefore, effort towards improving the non-formal training of craft man in solar and satellite systems installation in Niger State will have a significant impact of populace of the state.
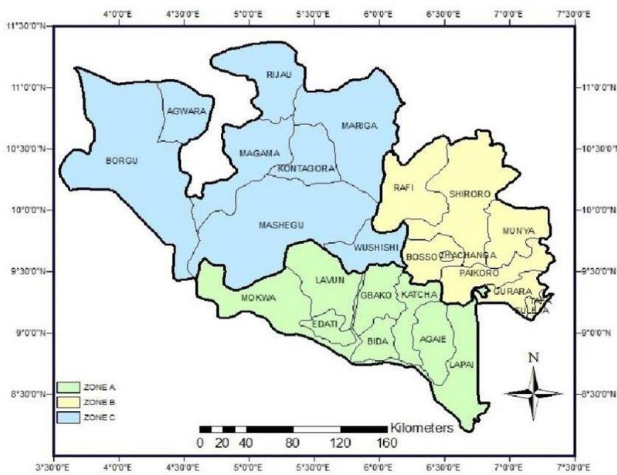

Figure 1: Map of the study area

4. Results

Table 1 shows the responses of respondents on tasks in the non-formal training of trainees in Solar system installation in Niger State. The result revealed that items 1-11,14,15,17,19 agreed with the mean range from 3.00-3.43 while item 12,13,16 and 18 disagreed with the mean range from 2.60-2.90 on the tasks in the non-formal training of trainees in Solar system installation in Niger State based on the decision. The result also revealed that the standard deviations (SD) of all items are within the ranges from 0.51 to 0.78, each of these values was less than 1.96 which indicated that respondents were not too far from the mean and from one another in their responses on the tasks in the non-formal training of trainees in Solar system installation in Niger State. This indicated most of the respondents agreed on the tasks in the non-formal training of trainees in Solar system installation in Niger State.

Table 2 shows the responses of respondents on task in non-formal training of trainees in Satellite system installation in Niger State. The result revealed that items 1-7 and 9-13 agreed with the mean range from 3.00-3.48 while only item 8 disagreed with the mean of 2.02 on the tasks in the non-formal training of trainees in satellite system installation in Niger State based on the decision. The standard deviations (SD) of all items are within the ranges from 0.51 to 0.78, each of these values was less than 1.96 which indicated that respondents were not too far from the mean and from one another in their responses on the tasks in the non-formal training of trainees in satellite system installation in Niger State. This indicated most of the respondents agreed on the tasks in the non-formal training of trainees in satellite system installation in Niger State.

Hypothesis: There is no significant difference between the mean response of master trainers and Trainees as regard the tasks in non- formal training of solar system installation in Niger State

Table 3 shows the comparison of z-test of the mean rating of the responses of the respondents as regard the tasks in non- formal training of solar system installation. The results revealed that the mean and standard deviation of trainer are 3.55 and 0.70 while the mean and standard deviation of trainee are 3.39 and 0.73 respectively. Since the p-value (0.52) is greater than 0.05, the result revealed that there is no significant difference between the mean responses of trainers and trainee on tasks in non- formal training of solar system installation. Therefore, the null hypothesis was accepted.

Hypothesis: There is no significant difference between the mean responses of master trainers and Trainees as regards the task in non- formal training of satellite system installation in Niger State.

Table 4 shows the comparison of z-test of the mean rating of the responses of the respondents as regards to the task in non- formal training of satellite system installation in Niger State. The results revealed that the mean and standard deviation of trainer are 3.71 and 0.75 while the mean and standard deviation of trainee are 3.49 and 0.68 respectively. Since the p-value (0.69) is greater than 0.05, hence there was no significant difference between the mean response of trainer and trainee regarding the task in non- formal training of satellite system installation in Niger State. Therefore, the null hypothesis was accepted.

The following findings emerged from the study based on the analyzed data:

-Tasks in non-formal training of trainees in Solar system installation in Niger State among others are; deciding on the best locations for solar equipment, setting up scaffolding, planning how to route cables, Installing solar panel mount and installing the solar panel.

-The task in non-formal training of trainees in Satellite system installation in Niger State among others are; setting up the wall mount, mounting on iron stand, assembling on the dish, pointing the dish to the satellite and wire the dish.

Table 1: Mean and standard deviation of respondents on tasks in non-formal training of trainees in solar system installation

S.N.	Items	$\overline{X}_1$ n₁=99	$\overline{X}_2$ n₂=243	$\overline{X}_T$ N=342	SD	Decision
1	Deciding on the best locations for solar equipment	3.00	3.29	3.15	0.56	A
2	Set up scaffolding	2.88	3.98	3.43	0.57	A
3	Planning how to route cables	2.97	3.02	3.00	0.62	A
4	Install solar panel mount	2.87	3.93	3.40	0.69	A
5	Install the solar panel	3.00	3.60	3.30	0.69	A
6	Route cables	3.03	3.63	3.33	0.68	A
7	Install solar inviter	3.94	2.70	3.32	0.63	A
8	Bond solar inverter and solar battery	3.00	3.54	3.27	0.64	A
9	Connect solar inverter to grid	3.35	2.80	3.08	0.64	A
10	Mounting of charge controller	3.60	3.00	3.30	0.51	A
11	Connect the inverter to the consumer unit	3.02	3.40	3.21	0.78	A
12	Start and test solar panels	3.04	2.15	2.60	0.78	D
13	Start solar inverter	2.39	2.72	2.56	0.63	D
14	Installing change over switch	2.62	3.65	3.14	0.68	A
15	Installation Testing	3.62	3.15	3.39	0.60	A
16	Polarity test	2.65	2.56	2.61	0.66	D
17	Continuity test	3.63	3.15	3.39	0.56	A
18	Earthing test	3.65	2.15	2.90	0.78	D
19	Follow up to ensure that the solar system is working properly	3.35	2.70	3.03	0.63	A

$\overline{X}_1$ = Mean response of Trainers, $\overline{X}_2$ = Mean response of Trainees, n1 = No of Trainer, n2 = No of trainees, $\overline{X}_T$ = Average mean response

Table 2: Mean and standard deviation of respondents in non-formal training of trainees in satellite system installation

S.N.	Items	$\overline{X}_1$ n₁=99	$\overline{X}_2$ n₂=243	$\overline{X}_T$ N=342	SD	Decision
1	Setting up the wall mount	2.96	3.02	3.00	0.55	A
2	Mounting on iron stand	2.98	3.03	3.01	0.57	A
3	Assembling on the dish	3.00	3.03	3.02	0.54	A
4	Pointing the dish to the satellite	2.98	3.03	3.01	0.65	A
5	Wire the dish	3.01	3.02	3.01	0.61	A
6	Protect the power cord from being pinched	3.01	3.03	3.02	0.60	A
7	Make sure that all ventilation openings are not covered	3.32	3.64	3.48	0.63	A
8	Do not install close to any source of heat or any apparatus that produce heat	2.04	2.00	2.02	0.64	D
9	Unplug all socket connections during lightning	3.04	3.35	3.20	0.64	A
10	Do not place any liquid substance on any part of the dish	3.32	3.54	3.43	0.39	A
11	Always unplug the receiver (decoder) from the AC power outlet before cleaning	3.21	3.02	3.12	0.69	A
12	Install the satellite antenna near overhead power lines or circuits	3.01	3.04	3.03	0.71	A
13	Test the system	2.98	3.03	3.02	0.72	A

$\overline{X}_1$ = Mean response of Trainers, $\overline{X}_2$ = Mean response of Trainees, n1 = No of Trainer, n2 = No of trainees, $\overline{X}_T$ = Average mean response

Table 3: Z-test analysis of tasks in non-formal training of solar system installation in Niger State

Variables	N	Mean	SD	Z	p-value
Trainers	99	3.55	0.70		
				0.77	0.52
Trainees	243	3.39	0.73		

Table 4: Z-test analysis of task in non- formal training of satellite system installation in Niger State

Variables	N	Mean	SD	Z	p-value
Trainers	99	3.71	0.75	0.83	0.69
Trainees	243	3.49	0.68		

5. Discussion

The findings on research question one revealed that tasks in non-formal training of trainees in Solar system installation in Niger State among others are deciding on the best locations for solar equipment, setting up scaffolding, planning how to route cables, installing solar panel mount, install solar inviter, bond solar inverter and solar battery connect solar inverter to grid, mounting of charge controller and installing the solar panel. This is in line with Zhao, (2012) who states that craftsmen task in solar system installation involve assemble solar modules, panels, or support structures, as specified. Install active solar systems, including solar collectors, concentrators, pumps, or fans. Apply weather sealing to array, building, or support mechanisms. Install photovoltaic (PV) systems in accordance with codes and standards using drawings, schematics, and instructions. Perform routine photovoltaic (PV) system maintenance on modules, arrays, batteries, power conditioning equipment, safety systems, structural systems, weather sealing, or balance of systems equipment. It also includes: Activate photovoltaic (PV) systems to verify system functionality and conformity to performance expectations. Check electrical installation for proper wiring, polarity, grounding, or integrity of terminations. Determine appropriate sizes, ratings, and locations for all system overcurrent devices, disconnect devices, grounding equipment, and surge suppression equipment. Determine connection interfaces for additional subpanels or for connecting photovoltaic (PV) systems with utility services or other power generation sources. Determine photovoltaic (PV) system designs or configurations based on factors such as customer needs, expectations, and site conditions.

The findings on hypothesis one revealed that there was no significant difference between the mean responses of trainers and trainees on tasks in non- formal training of solar system installation in Niger State. The findings on hypothesis one which says that there is no significant difference between the mean response of master trainer and trainee as regard the tasks in non-formal training of solar system installation in Niger State revealed that there was no significant difference between the mean response of master trainer and trainee as regard the tasks in non-

formal training of solar system installation in Niger State. This implies that the tasks in non-formal training of solar system installation in Niger State does not have influence on the master trainer and trainee. This findings is in support of Ogbuanya et al. (2020) assessed the apprenticeship system and labour supply of electrical installation artisans in Enugu State, it revealed that there was no significant difference between the mean responses of early apprentices and late apprentices on the attraction of apprentices' enrolment into apprenticeship system, and on motivation indices and instructional modalities. The study related to the present study in the area of apprenticeship and electrical installation. Though it was carried out in Enugu State, South Estate of Nigeria.

The findings on research question two revealed that the task in non-formal training of trainees in Satellite system installation in Niger State among them are setting up the wall mount, mounting on iron stand, assembling on the dish, pointing the dish to the satellite, make sure that all ventilation openings are not covered, unplug all socket connections during lightning, do not place any liquid substance on any part of the dish and wire the dish. The findings of the study corroborate with Titlow, (2012) state that every standard size dish enables simultaneous reception from multiple different satellite positions without re-positioning the dish, just by adding additional LNB or using Special Duo LNB or Triple or Four Feed Monoblock LNB. However some designs much more effectively optimize simultaneous reception from multiple different satellite positions without re-positioning the dish. The vertical axis operates as an off-axis concave parabolic concave hyperbolic Cassegrain reflector, while the horizontal axis operates as a concave convex Cassegrain. The spot from the main dish wanders across the secondary, which corrects astigmatism by its varying curvature. The elliptic aperture of the primary is designed to fit the deformed illumination by the horns. Due to double spill-over, this makes more sense for a large dish.

The findings on hypothesis two revealed that there was no significant difference between the mean responses of trainer and trainee as regards the task in non-formal training of satellite system installation in Niger State. The findings on hypothesis two is inline with Onoh, (2019), he investigated electrical installation and maintenance skill needs of Technical college graduates for job creation and self-reliance in Enugu state. Some of the findings include: electrical installation and maintenance work skills like

Planning the layout and installation of wiring, testing of electrical work for safety, Competence with tools, effectives use of materials, inspection of electrical installation, interpretation of wiring drawing and the likes are highly needed for job creation.

6. Conclusion

The study assessed the tasks, activities and workings materials in the non-formal training of craft man in solar and satellite systems installation in Niger State. Apprenticeship exists in business, agriculture, technology, medicine and other professional areas. Apprenticeship which is learning through observation and doing is practiced almost in every area of life. The result on the tasks in non- formal training of trainees in Solar system installation in Niger State revealed that it is best deciding the locations for solar equipment, Setting up scaffolding, Planning how to route cables and to install solar panel mount while the result on task in non-formal training of trainees in Satellite system installation in Niger State revealed that setting up the wall mount, mounting on iron stand, assembling on the dish, pointing the dish to the satellite, to wire the dish and to finally test the system. A nation's ailing economy can only be improved upon where individuals and other able bodied people not reached through the formal school setting are sufficiently skilled in various economic sectors of the nation.

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References

Atoyinbo, A. (2016). Knowledge management and competitive advantage: the interaction effect of market orientation. *African Journal of Business Management, 4(*14), 271-280.

Bailey, K.M. (2013). *Learning about language assessment: dilemmas, decisionjs, and directions.* Heinle& Heinle: US.

Barab, N.D., & Hay, A.K. (2012). *Assessment of training needs: A case study of Sri Lanka.* Rotterdam: CIB publication.

Chris, C.A. (2016). *Improving the apprenticeship system for skills acquisition, job creation and poverty reduction: The Business education perception in the NEEDS agenda.*

Collins, T.N. Brown, M. J. and Newman, T. (2016). *Re-dimensional sings boundaries in the theory and practice of Human Resource Development.* Mega Press.

Crawl, O., McGrath, S. King, K. Leach, F.and Carr-Hill, R. (1997). Education and training for the informal Sector. *Education Research, Overseas Development Administration, 1(*11), 67-78

Ebay, G.H. (2013). The construction labour market skills crisis: the perspective of small-medium-sized firms. *Journal of Construction Management and Economics, 23(*4), 387-398.

Elias, J. (2014). World trends and issues in adult education on the eve of the twenty-first century. *International Review of Education*, 486-506.

Huitt, R. (2012). *Planning occupational education training for development.* New York: Praeger Publishers.

Jonassen, D.H. & Duffy, T. (2014). *Constructivism and the technology of instruction: A conversation.* Hillsdale, New Jersey.

Jones, J. (2017). The European construction industry and its competitiveness: A construct of the European Commission. *Construction of Management and Economics*, 18, 711-720.

Mbanusi, D.J. (2008). *Appraisal of personnel training policies in the Nigerian construction industry.* Ahmadu Bello University, Zaria.

Nick, I. (2012). *The shortage of skilled craft workers in the U.S. University of Texas, America.*

Ochiagha, M.T., (2013). Knowledge management and competitive advantage: the interaction effect of market orientation. *African Journal of Business Management, 4(*14), 271-280.

OECD. (2018). *Building blocks to prosperity: The peacebuilding and state building goals.* Development Assistance Committee (DAC), OECD.

Ogbuanya, S.O. Nwachukwu, C.E., Igbo, C.A. Onyemachi, G.A. & Ekong, A.O. (2020). *Curriculum development and management in vocational technical Education.* Onitsha: Cape Publishers International Limited.

Okorie, H. & Ezeji, A.A. (2012). *Imperatives of construction workforce training: Improving the provisions with training best practice.*

Okorie, J.U. (2014). *Developing Nigeria's workforce.* Calabar: Page Environs

Okoro, O.M. (2006). *Principles and methods in vocational and technical education.* Nsukka: University Trust Publishers.

Onoh, C. (2019). *Managing agricultural education and training: Resources, principles and methods.* Enugu: Belony International Publishers.

Osinem, J. & Nwoji, A. (2014). *The continuous assessment system in Nigeria: The problems and challenges ahead in Badmas.*

Pratt, M. (2011). *Skills shortage in the residential constructions industry: A report to the Canadian mortgage and housing corporation*.

Rouse, F. (2008). *The development of the water management system of Angkor: A Provisional model Indo-Pacific prehistory association*. Bulletin, 1-11.

Stephen, R. (2015). *Portfolios for assessment and instruction.* ERIC Digest. EDRS NO: ED388890.

Titlow, A.S. (2012) *Contracts labour in the construction industry in the 21st century*. Report for the ILO.

World Bank. (2014). *Critical issue: Ensuring equity with alternative assessments*. Oak Brook: IL.

Zhao, G. (2012). Flexibility, labour subcontracting and HRM in the construction industry in Singapore: Can the system be refined. *International Journal of Human Resource Management, 8(*5), 690-709.