DEVICE TRACKING AND PREVENTION OF LOSS OF WORKSHOP TOOLS IN TECHNICAL COLLEGES IN RIVERS STATE

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Abstract

This study on device tracking as a strategy for effective prevention of loss of workshop tools in technical colleges in Rivers State was necessitated by the frequent loss of tools in workshops in technical colleges. One research question guided the study and two null hypotheses were tested. Descriptive survey research design was employed for the study. The population for this study consisted of 120 (78 teachers and 48 workshop attendants) in four technical colleges in Rivers State. The entire population was studied without sampling since the size was not too large and was manageable. The instrument for data collection was a structured questionnaire titled 'Device Tracking as a Strategy for Prevention of loss of workshop tools'. The instrument was validated by three experts from the Departments of Industrial Technical Education and Vocational Education and Educational Foundations of Ignatius Ajuru University of Education, Port Harcourt. Using the Cronbach alpha method to determine the reliability of the instrument, the reliability co-efficient of 0.75 was obtained. The data collected for the study were analyzed using mean and standard deviation to answer the research questions and to determine the closeness of the respondents' mean ratings. The t-test was used to test the null hypotheses at 0.05 level of significance. The findings of study revealed that, the use of tracking devices will be very effective strategy for prevention of loss tools in workshops in technical colleges. The findings also showed that there was no significant difference in the opinions of teachers and workshop attendants on the use of tracking devices as effective strategy for prevention of loss tools in workshops in technical colleges. Based on the findings of this study, it was recommended that the use tracking devices will be effective for prevention of loss of workshop tools in technical colleges in Rivers State.

Keywords: Device Tracking, Prevention of Loss, Workshop Tools, Technical Colleges.

Introduction

The development of any nation depends on the availability of skilled manpower. Technical colleges are concerned with production of technicians who are skilled in different fields of human endeavour. The type of technicians produced at technical college level include electronic/electrical technicians, automobile/metalwork technicians, and building/woodwork technicians among others. Training of technicians at technical college involves imparting both theoretical and practical knowledge to students under the guidance of the teacher within the school environment. Students at technical colleges are exposed to different skilled areas, through which one can be trained to be self-reliant. The type of education carried out at technical college level is known as vocational and technical education.

Technical colleges according to Akpan (2015) provide technical and vocational education and training to students for a particular career and occupation. Vocational and Technical education is an aspect of that leads to acquisition of practical skills as well as basic scientific knowledge (Abel, 2019). At technical college, vocational and technical education is provided to impart technical/occupational skills in the areas of metalwork, woodwork, automobile, electrical, radio, television and electronic works. In the context of this study, technical colleges are government established educational institutions that prepare individuals to acquire practical skills, basic and scientific knowledge and

attitude required by craftsmen and technicians at sub-professional levels. Teachers and students in those skill areas carryout practical works at designated workshops.

A workshop is a building where practical training on skill acquisition is carried out. Denga (2013) states that workshop is a workplace where machining, automobile, electrical/electronics, woodwork, fabrication, foundry, forging or welding operations, construction, maintenance or repairs is carried out. Technical colleges' workshop is a unique learning situation in which the learners may experiment, test, construct, disassemble, repair, design, create, imagine and study (Ezeji, 2014). This explains the fact that technical education and its related workshop practices is a programme whereby students acquire industrial-technical knowledge and skills through creative and problem-solving learning experience involving activities such as experimenting, planning, designing, constructing, evaluating and using tools, machines, materials and processes. Every vocational and technical trade or craft has its own workshop for teachers and students' practical works. The major components of workshops are tools, machine, materials and consumables. Some of these tools and machines operates or are energized through electric power. In the context of this study, workshop is a place where mechanical, electrical, electronics, automobile and woodwork practical, training, repair and maintenance is carried out in technical colleges. The functionality and usability of these workshops largely depends on availability, adequacy and utilization of workshop tools. This impresses on the need for the prevention of loss of workshop tools through effective preventive strategies

Workshop tool is any instrument of operation for performing and assisting the work or facilitating mechanical operations in the workshop (Golden, 2022). According to Yash Shah (2012), tools play important role everywhere and affect almost every person, in any part of the world. Today tools are utilized for numerous purposes. They help to mechanize various manual tasks and also make the related process simple. It enables one to complete the particular work faster and reduce the manual efforts and thereby increase productivity. Nowadays, various types of workshop tools are manufactured in many countries across the globe. These tool room are commonly used for different purposes in a wide range of industrial segments such as woodworking, automobile, electrical, construction among others. Good quality workshop tools are very important in obtaining high quality output with better accuracy.

Tools are particularly important in workshop practice. They are primarily used to put things together as in the case of hammers and nail guns; or to take things apart as in the case of jackhammers and saws. Tools are often classified as hand tools and power tools. Hand tools include all non-powered tools, such as hammers and pliers. Power tools are divided into classes, depending on the power source: electrical tools (powered by electricity), pneumatic tools (powered by compressed air), liquid-fuel tools (usually powered by gasoline), powder-actuated tools (usually powered by an explosive and operated like a gun) and hydraulic tools (powered by pressure from a liquid).

However, the availability of workshop tools is a serious problem plaguing most technical colleges in Nigeria due to loss of tools (Nwogu, 2017). Availability of workshop tools is the key to get job done; which is essential for successful acquisition of skills. The availability and adequacy of workshop tools also increases efficiency. When teachers and students do not have the tools they need, it forces them to get creative and use what they have to the best of their ability. This can greatly hurt productivity among students and teachers and institution's bottom line. On the other hand, when the workshops

are equipped with tools, teachers and students alike are focused on getting the job done as efficiently as possible rather than on how to get the job done with improvised or wrong tool.

Loss of workshop tools is the disappearance of tools either through stealing, misplacement and displacement. The disappearance of these tools could be as a result of intentional or unintentional acts of students, teachers and workshop attendants who usually make use of them. Negligence in the opinion of Nwauzi (2015) is another factor responsible for loss of tools in workshops. The problems and ugly situations created when tools are missing or lost affects workshop practice as some of those lost tools sometimes are needed during such practice. This situation should have been avoided if strategies for effective prevention of workshop tools were implemented in technical colleges.

To ensure the availability of workshop tools in technical colleges, certain strategies need to observed and implemented to forestall or prevent the loss of tools. The strategies include the use of computerized sign out and sign back form, metal detector doors, solar-powered camera, colour-coding of tools, engraving of tools, tracking the location of tools among others.

The tracking of location of tools has tremendously prevented the tools in most factories and workshops. There are several options available when it comes to the tracking of tools. Roger (2016) outlined seven (7) most basic methods that are used for tool tracking. The methods include pen and paper method, spreadsheet approach, barcode, radio frequency identification, near field communication, Bluetooth low energy and global positioning system.

When there were no technologies, the pen and paper method was used for tracking of tools. This was the first traditional and most basic method used for tool tracking (Bryl, 2016). This method requires employees to devote time on searching tool information; which results in decreased productivity and wastage of manpower.

The spreadsheet approach was another method used in tracking tools. This approach has some advantages over the pen and paper method. This spreadsheet is used to put information about each tool, so that employees can retrieve tool information at the need of the hour. However, the spreadsheet approach has some problems too. For instance, when spreadsheet is accessed by many employees or when many employees put information about the tool, chances are there that wrong data can be filled in the spreadsheet resulting in inefficient tool tracking (Dansa, 2016). In the quest for humans to improve in tracking of tools, barcode was introduced.

Barcode was the first technology which was very effective and reliable in terms of tool tracking. Barcode is a series of black and white parallel lines. They are very economical in tracking of tools. Barcode removes the problems of spreadsheet usage. It is simple to use. It easily enable employees to keep data of tools updated (Eaton, 2017). It also gives lots of data about tools which was unthinkable in earlier approaches. The problem with barcode is that they need to properly align in a straight line in order to get scanned or to get information. In recent times, QR-code is an advanced version of the barcode. It has a square & rectangle shape with black pixels in it.

Also, the technology of RFID is almost the same as the Barcode. However, RFID works faster compared to the Barcode scanner. It uses radio waves to track product or tool information (Singer, 2015). It enables digital data encoded in RFID tags. In RFID the data from a tag is captured through a reader device and transferred to store in a database. RFID is more protected as it has a waterproof layer for its security.

Near Field Communication (NFC) and RFID are quite similar to each other. In order to keep track of ones inventory on tools one do not any specific scanning equipment. A person can use a personal smartphone for tools tracking. However, it has only a few inches of range. Therefore, one cannot use it from a distance. NFC processes is very quick and efficient.

In fulfilling the purpose of tools tracking Bluetooth low energy was also introduced. Via smartphones, one can have moving trackers which produce Bluetooth signal and these signals are picked by smartphones when its Bluetooth is enabled. Similarly, moving tracker signals can be picked by Bluetooth getaways and so on. In order to ensure more accurate tracking of tools, more BLE beacons can be installed for precise position or location of tools (Kingsley, 2016).

Global Positioning System tracking is the most recent innovation in was initially started in fleet management. However, this technology is not only used in the automobile industry but also in other industries. GPS tracking allows a person to track his or her assets across the world. It monitors ones tools, asset and inventory efficiently. In a simple way, Lion (2016) describes it as an eye in the sky, which gives a person all the information one need about his or her asset. GPS tracking requires a tracking device to be installed in an asset, or to be worn by a person. The device then provides information about its exact location and subsequent movements, enabling tracking in real-time. A GPS tracking device can be used by fleet managers to locate where a truck or asset is on its route, report on traffic conditions, and monitor how long each vehicle spends at a jobsite. The only issue with GPS tracking is that, it needs quite some energy.

The tracking of tools according Zenab (2016) has successfully prevented the loss of tools and materials in many industries. The use of barcode and GPS in tracking tools are predominant in recent times. In the context of this study, the tracking of workshop tools is process of locating the position of tools at any given time through the use of tracking devices.

Tracking of tools is one of the best options one could have to avoid losing tools at work, with a simple inventory app giving one the ability to connect a GPS to the products. The small trackers are a useful tool and go completely unnoticed in the toolbox. The tracking software is ideal in keep a close eye on all of workshop tools thus preventing losses (Anderson, 2019). Tools tracking is the process of locating the position of tools in real time. It is known as one the tools management techniques. The main objective of tool tracking is to avoid tool theft and loss.

Due to the importance attached to the functionality and effectiveness of workshops in Technical Colleges in Nigeria and especially in Rivers State, it is necessary to adopt appropriate strategies for effective prevention of loss of workshop tools in these institutions. Such strategies will not only ensure availability and adequacy of workshop tools and equipment but will also provide a basis for prevention of loss of workshop tools in other educational institutions across the country and in Rivers State in particular.

Statement of the Problem

The values of vocational and technical education through technical colleges are not only quantified on the basis of availability, adequacy and quality of teachers but also on the availability, adequacy and utilization of workshop tools. Workshop tools are instrumental in acquisition of practical skills by students in their various fields of study. Unfortunately, the condition of various workshops in technical colleges in the country and especially in Rivers State in terms of workshop tools is nothing to write home about. Fafunwa in Amadike and Agwi (2015) observed that, one major setback in the

teaching of technical subjects in many technical colleges is the lack of workshop tools. Adewumi (2010) also stated that some technical colleges in Rivers State were without workshops tools and equipment.

The scenario is as a result of incessant loss of tools in workshops and not that the workshops were initially and periodically equipped with tools. The reoccurring loss of tools in technical college workshops is a bad omen for the development and sustainability technological advancement and skill acquisition. Undoubtedly, this situation may be as a result of lack of application of current and existing strategies for effective prevention of loss of workshop tools technical colleges. The present researcher is worried about this ugly situation, hence sought to examine the use of tracking devices as strategy for effective prevention of loss of workshop tools in technical colleges in Rivers State.

Aim and Objectives of the Study

The aim of this study was to examine tracking devices as a strategy for effective prevention of loss of workshop tools in technical colleges in Rivers State.

Research Question

The following research question was raised to guide the study.

i. How effective will the use of tracking devices prevent loss of workshop tools in technical colleges.

Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance.

i. Teachers and workshop attendants did not differ in their mean ratings on the effectiveness of the use of tracking devices as a strategy for prevention of loss of workshop tools in technical colleges.
ii. Workshop attendants in rural and urban areas do not differ in their mean ratings on the effectiveness of the use of tracking devices as a strategy for prevention of loss of workshop tools in technical colleges.

Method

This study adopted a descriptive survey research design. The population for this study consisted of 120; 72 teachers and 48 workshop attendants in four technical colleges in Rivers State namely, Technical College Ahuoda, Technical College Tombia, Technical College Port Harcourt and Technical College Elogu. The entire population was studied since the population was not too large and was manageable. The instrument for data collection for this study was a structured questionnaire titled 'Tracking Devices and Prevention of Loss of Workshop Tools (TDPLETQ). It has sections A and B. Section A contains two items on demographic data of respondents while Section B contains 7 items on a four-point rating scale of Very Effective (VE), Effective (E), Ineffective (I) and Very Ineffective (VI). Two experts in Technical Education Department of Ignatius Ajuru University of Education validated the instrument. The reliability of the instrument was established using a pilot test involving 10 teachers and 10 workshop attendants of technical colleges in Bayelsa State; which is outside the area of study. Data collected for the pilot study were analyzed with Cronbach alpha. The reliability coefficient values of 0.75 was obtained. The researcher thereafter administered and retrieved 120 copies of the questionnaire.es which was used for data analysis. The data collected for the study were analyzed using the arithmetic mean and standard deviation to answer the research

questions and determine the closeness of the responses to the means respectively. Decision on the questionnaire items and research questions were based on item and cluster means relative to the real limits of numbers shown below:

Response	Rating Scale	Real Limits of Numbers
Very Effective (VE)	4	3.50 - 4.00
Effective (E)	3	2.50 -3.49
Ineffective (I)	2	1.50 - 2.49
Very Ineffective (VI)	1	0.50 -1.49

The z-test statistical tool was used to test the null hypotheses at 0.05 level of significance. A null hypothesis was rejected where the calculated p-value was less than the 0.05 level of significance, it meant that there was a significant difference between mean scores. Conversely, where the calculated p-value was greater than or equal to the level of significance (0.05), it meant that there was no significant difference and the hypothesis was accepted.

Results

Data collected with respect to the research question and hypotheses were analyzed and presented in tables 1 to 3.

Research Question One: How effective will the use of tracking devices prevent loss of workshop tools in technical colleges?

Data collected in respect of research question 4 was analyzed and presented in table 1.

Table 1: Respondents mean ratings on the effectiveness of tracking devices for prevention of loss of workshop tools.

S/No	*Aspect of Tracking*	*Mean*	*SD*	*Remarks*
1	Ability to reveal the exact location of tools in real time	3.54	0.57	VE
2	Ability to transmit information on the exact location of tools	3.50	0.50	VE
3	Ability to provide data on tools	3.54	0.44	VE
4	Efficiency and Fast tracking process	3.58	0.53	VE
5	Ability to transmit stored information about tools in database	3.62	0.41	VE
6	Ability to scare individuals from stealing tools	3.54	0.47	VE
7	Compatibility with smartphones	3.53	0.53	VE
	Cluster Mean	3.55	0.49	VE

Table 1 shows that all the items have a cluster mean of 3.55; which indicate that teachers and workshop attendants agreed that the use tracking devices will be very effective for prevention of loss of workshop tools in technical colleges in Rivers State. The standard deviation of 0.50 show that the respondents are homogenous in their opinions.

Hypothesis 1: Teachers and workshop attendants did not differ in their mean ratings on the effectiveness of the use of tracking devices as a strategy for prevention of loss of workshop tools in technical colleges.

Data collected in respect to hypothesis 1 was analyzed and presented in table 2

Table 2. z-test comparison of the mean ratings teachers and workshop attendants on the effectiveness of tracking devices for prevention of loss of workshop tools.

Category of Respondents	*N*	$\overline{X}$	*SD*	*α*	*df*	*t-cal*	*p-value*	
Teachers	72	3.53	.49					
				0.05	118	1.47	.068	Not Significant
Attendants	48	2.43	.52					

Data in Table 2 show that both teachers and workshop attendants did not differ significantly in their mean ratings on the use of tracking devicesas an effective strategy for prevention of loss of workshop tools in technical colleges in Rivers State, with mean scores of 3.53 and 3.61, while the corresponding standard deviation is .49 and .52. The Table indicated a t-value of 1.47, at degree of freedom of 118 and a p-value of .068. Testing at alpha level of 0.05, the p-value is not significant since the p-value is greater than the alpha value (0.05). Therefore, the null hypothesis is not rejected.

Hypothesis 2: Workshop attendants in both rural and urban areas did not differ in their mean ratings on the effectiveness of the use of tracking devices as a strategy for prevention of loss of workshop tools in technical colleges.

Data collected in respect to hypothesis 2 was analyzed and presented in table 3 below:

Table 3: z-test comparison of the mean ratings of workshop attendants in both rural and urban areas on the effectiveness of tracking devices for prevention of loss of workshop tools.

Category of Respondents	*N*	$\overline{X}$	*SD*	*α*	*df*	*t-cal*	*p-value*	
Teachers	72	2.43	43					
				0.05	118	1.34	.073	Not Significant
Attendants	48	2.43	.46					

Data in Table 3 show that the respondents do not differ significantly in their mean ratings on the use of tracking devices as an effective strategy for prevention of loss of workshop tools in technical colleges in Rivers State, with mean scores of 2.43 and 2.42 while the corresponding standard deviation is .43 and .46. The Table indicated a t-value of 1.34, at degree of freedom of 118 and a p-value of .073. Testing at alpha level of 0.05, the p-value is not significant, since the p-value is greater than the alpha value (0.05). Therefore, the null hypothesis is not rejected.

Discussion

Results of the study showed that teachers and workshop attendants are of the opinion that tracking devices will be a strategy for effective for the prevention of loss of workshop tools in technical colleges in Rivers State. The study revealed that tracking devices are able to reveal the exact location of tools in real time, transmit information on the exact location of tools, provide data about tools, ensures efficient and fast-tracking process, scare individual from stealing tools and smartphones compatible.

The findings of this study is in line with of Eaton (2017) who observed that tracking devices have the ability to locate assets in real time. With the device, an individual could be able to detect and trace the location of any object, item and a person in real time. This is also in agreement with Singer (2015) who noted that tracking devices are used for fast or quick tracing of assets no matter the locations. With the use tracking devices most stolen items have been discovered and retrieved by their owners. The findings of the study is also in consonant with the of Kingsley (2016) who stated that tracking devices transmit information about the location of object under view irrespective of distance involved.

The result of the study is also in agreement with that of Lion (2016) who opined that tracking devices deter individuals from stealing, knowing full well that they can only run but cannot hide. This is also in agreement with Zenab (2016) who observed that most persons are sometimes scared of stealing since they are fully aware that they could be tracked. The analysis of the hypotheses indicates that there is no significant difference in the mean ratings of respondents on the use of tracking devices as strategy for effective for the prevention of loss of workshop tools in technical colleges in Rivers State.

Conclusion

On the basis of the findings of the study, it was concluded that tracking devices is a strategy for effective prevention of loss of workshop tools in technical colleges in Rivers State

Recommendation

Based on the findings of the study and the conclusion reached, it was recommended that:

trackers should be installed in all workshop tools by the government for easy tracking and tracing of misplaced or stolen tools.

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