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Utilization of Instructional Materials for Effective Teaching of Electrical Installation and Maintenance Works Trade in Technical Colleges of Adamawa State

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Abstract: ***The main aim of the study was to assess the utilization of instructional materials for effective teaching of electrical installation and maintenance works in Technical Colleges of Adamawa State. Three research questions and three hypotheses guided the study which adopted a descriptive survey research design. The population of the study was 37 subjects consisting of 13 electrical installation and maintenance works trade teachers and 24 administrators of the three Technical Collages in Adamawa State. The entire population was used for the study, hence, sampling was not employed. The instrument used for data collection was a structured questionnaire titled: "Utilization of Instructional Materials for Effective Teaching of Questionnaire" (UIMFTQ) developed by the researchers. The instrument was validated by three experts and a reliability of 0.86 was obtained using Cronbach Alpha method. Mean and t-test were used to answer the three research questions and test the null hypotheses of the study at 0.05 level of significance respectively. Findings of the study revealed the usefulness of instructional materials includes: making lesson presentation more interesting to the learner, promotes learning, attracting students' attention, contributes in recalling previous experiences. The study further revealed that the factors affecting the effective use of instructional materials in teaching of electrical installation and maintenance works trade include: unavailability of trained teachers on the use of instructional materials and lack adequate supervisory services by the school authorities among others. Based on the findings of the study, Ministry of Education should encourage teachers to make good use of the available instructional materials to make teaching and learning more interesting and simple for learners and trade teachers should be encouraged to go for in-service training in order to update their knowledge and skills in the use of instructional materials.***

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Keywords: Utilization, Instructional Materials, Effective Teaching, Electrical Installation and Maintenance, Technical Colleges.

1. INTRODUCTION

Technical Education is the cornerstone of any country's development and it continues to be the instrument for achieving economic realities, scientific and technological growth and development of any nation. Technical education as enshrined in the Nigerian National Policy on Education (Federal Republic of Nigeria [FRN], 2013), is concerned with qualitative technological and human resources development that is directed towards a national pool of skilled and self-reliant, craftsmen, technicians and technologists in technical and vocational education fields, such as motor vehicle mechanics, carpentry and joinery, welding and fabrication, painting and decoration, among others (Okoye & Maxwel, 2016). Technical education as offered in technical colleges is regulated by the National Board for Technical Education (NBTE). NBTE is saddled with the responsibility of moderating the principles of operation and academic programs, the quality of academic program, periodic accreditation of trades offered, curriculum development and supervision of the Technical Colleges (NBTE, 2011). On the other hand, the National Business and Technical Examination Board (NABTEB) is responsible for the examination and certification of the occupational trades, leading to the award of National Technical Certificate (NTC), Advance National Technical Certificate (ANTC) and Advance National Business Certificate (ANBC).

Electrical Installation and Maintenance Works trade is one of the trades offered in the Technical Colleges. According to Wikipedia (2012) Electrical Installation and Maintenance Works trade is a program in Technical Collages that involves practical training and the maintenance of electrical system and circuits. National Board for Technical Education (2011) recommended that graduates of Electrical Installation and Maintenance Works trade are expected to be able to test, diagnose, service, install and completely repair any fault on electrical machines and electrical appliances. In order to attain these expectations, graduates of Electrical Installation and Maintenance Works trade, should be appropriately taught using effective teaching and learning method that can easily integrate the use of instructional materials in classroom. Agun (2017) stated that teaching of Electrical Installation and Maintenance Work trade is so complex, it needs in-depth follow up from teachers in order to make the learners informed and have a practice of what they learn.

Gray (2016) suggested that teaching and learning activities will be interesting when instructional materials are used effectively and efficiently in a classroom-teaching situation especially in Technical Colleges. It may be necessary for teachers in Technical Colleges to use instructional materials in order to make their teaching more interesting and simple. Since the use of instructional Materials arouses the learners' interest and attracts their attention for effective learning (Evah, 2007). According to Emmamanuel (2015), the need for the use of instructional materials in Technical Colleges cannot be over-emphasized in this technology-driven age, where everyone needs requisite skills to survive in the competitive labour markets. According to Akpan (2017), in most Technical Colleges in Nigeria, there are inadequate uses of instructional materials that aid in disseminating the required knowledge to the students. Thus, the ineffective and inefficient use of instructional materials has badly affected the performance of students of Technical Colleges in practical and in external examinations.

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Statement of the Problem

The continued decline in the academic achievement of students in Electrical Installation and Maintenance Works trade in Adamawa State Technical Colleges is a traumatic problem. The result of the National Business and Technical Examination Board from 2015 shows a low students' performance in Electrical Installation and Maintenance Works Trades examination with only 49% passes and 51% failure recorded in Adamawa State, and the failure increased to 70% in 2019. However, Silas (2018) advocated for the use of instructional materials as a means of transforming students' method of learning and that teachers need to actively participate in the use and implementation of instructional materials.

Purpose of the Study

The main purpose of the study was to assess the utilization of instructional materials for effective teaching of electrical installation and maintenance works in Technical Colleges of Adamawa State. This study sought to:

1. Determine the perception of teachers and administrators on the use of instructional materials for effective teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges
2. Determine the perception of teachers and administrators on the factors affecting the effective use of instructional materials in teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges
3. Determine the perception of teachers and administrators on the strategies for improving the use of instructional materials in teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges

Research Questions

The following research question guided the study

1. What is the perception of teachers and administrators on the use of instructional materials for effective teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges
2. What is the perception of teachers and administrators on the factors affecting the effective use of instructional materials in teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges
3. What is the perception of teachers and administrators on the strategies for improving the use of instructional materials in teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges

Hypotheses

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

1. There is no significant difference between the mean perception of teachers and administrators on the use of instructional materials for effective teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges
2. There is no significant difference between the mean perception of teachers and administrators on the factors affecting the effective use of instructional materials in teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges

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3. There is no significant difference between the mean perception of teachers and administrators on the strategies for improving the use of instructional materials in teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges

2. METHODOLOGY

The study which was conducted in Adamawa State, Nigeria, adopted a descriptive survey research design. Adamawa State is located at the north -eastern part of Nigeria and lies within latitude 9.333^0 of North and Longitude of 12.500^0 East of the equator. it shares boundaries with Borno and Gombe states in the North West and Taraba state in the south. In the east is Cameroon Republic. The population of the study was 37 respondents consisting of 13 electrical installation and maintenance works trade teachers and 24 administrators of the three Technical Collages in Adamawa State. Due to the manageable size of the population, there was no sampling, hence, the whole population was used for the study. The instrument used for data collection was a structured questionnaire titled: "Utilization of Instructional Materials for Effective Teaching of Questionnaire" (UIMFTQ) developed by the researchers. The responses on the questionnaire were structured on a 5-point likert scale of Strongly Agreed (SA) = 5; Agreed (A) = 4; Undecided (U) = 3; Disagreed (D) = 2 and Strongly Disagreed (SD) = 1. The questionnaire was validated by three experts from the Department of Electrical Technology Education, Modibbo Adama University, Yola, Adamawa State. A reliability co-efficient of 0.86 was obtained for the instrument using Cronbach Alpha reliability method after a trial test of the instrument was conducted on 10 teachers and 10 Administrators of Government Technical College, Kumo, Gombe state, which was not part of the study area. Data for the study was collected by the researchers. Mean statistic was used to answer the three research questions of the study while t-test was used to test the null hypotheses of the study. All items with mean score of 3.0 and above were considered "Agreed" and if less than 3.0 was also considered as "Disagreed".

3. RESULTS

Research Question 1: What are the perception of teachers and administrators on the use of instructional materials for effective teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges?

Table 1: Mean and Standard Deviation of the Perception of Teachers and Administrators on the Use of Instructional Materials

		Respondents:		$N_T = 13$		$N_A = 24$		
S/NO	**ITEMS**	$\bar{x}_A$	$s^2{}_A$	$\bar{x}_T$	$s^2{}_T$	$\bar{x}_G$	$s^2{}_G$	**Remark**
1.	Instructional materials aids in ensuring effective lesson delivery	4.33	0.70	4.31	0.75	4.32	0.71	Agreed
2.	The use of instructional materials aid students' performance positively	4.63	0.82	4.62	0.96	4.62	0.86	Agreed

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3.	The use of instructional materials helps Students in recalling previous experiences	4.04	1.23	3.92	1.38	4.00	1.27	Agreed
4.	Instructional materials helps in introducing new topics easily	4.00	0.88	3.92	0.49	3.97	0.76	Agreed
5.	Instructional materials complement visual symbols during lesson delivery	2.21	1.32	2.15	1.07	2.19	1.22	Disagreed
6.	Instructional materials helps in attracting students' attention during lesson delivery	3.58	1.06	3.54	1.13	3.57	1.07	Agreed
7.	Instructional materials encourages students' participation during lesson delivery	3.63	0.71	3.62	0.77	3.62	0.72	Agreed
8.	Instructional materials promote learning	4.38	0.71	4.31	0.95	4.35	0.79	Agreed
9.	Instructional materials encourages teachers during lesson presentation	3.63	0.92	3.62	0.77	3.62	0.86	Agreed
10.	Instructional materials make lesson presentation more interesting to the learner	3.54	0.98	3.54	1.20	3.54	1.04	Agreed
	Group Mean	**3.80**		**3.76**		**3.78**		**Agreed**

$\bar{x}_A$= Mean of Administrators, $\bar{x}_T$ = Mean of Teachers, s_A= Standard deviation of Administrators, s_T = Standard deviation of Teachers, $\bar{x}_G$= Grand Mean, s_G = Grand Standard deviation, N_A = Number of Administrators, N_T = Number of Teachers

Table 1 answers research question two. The respondents agreed with all of the items listed except item 15. The respondents summarily agreed with a grand mean response of 3.78 that instructional materials are very useful for effective teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges.

Research Question 2: What are the perception of teachers and administrators on the factors affecting the effective use of instructional materials in teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges?

Table 2: Mean and Standard Deviation of the Perception of Teachers and Administrators on the Factors Affecting the Effective Use of Instructional Materials

		Respondents: N_A = 24, N_T = 13						
S/N	**ITEMS**	$\bar{x}_A$	$s^2{}_A$	$\bar{x}_T$	$s^2{}_T$	$\bar{x}_G$	$s^2{}_G$	**Remark**
11.	Unavailability of trained teachers on the use of instructional materials affect the teaching and learning in	4.50	0.51	4.46	0.52	4.49	0.51	Agreed

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	technical colleges							
12.	Teachers' incompetency in the use of instructional materials affect the teaching and learning in technical colleges	3.96	0.46	3.92	0.49	3.95	0.47	Agreed
13.	Negligence by the teachers to use instructional materials	4.04	0.75	3.92	0.95	4.00	0.82	Agreed
14.	Poor maintenance culture on instructional materials by the college authorities	3.67	0.82	3.62	0.65	3.65	0.75	Agreed
15.	Lack of adequate supervisory service by the school authorities affect the use of instructional materials in schools	3.83	0.96	3.77	1.30	3.81	1.08	Agreed
16.	Lack of motivation to teachers affect the use of instructional materials in colleges	3.92	1.06	3.92	1.19	3.92	1.09	Agreed
17.	Poor school funding by the government	4.17	0.96	4.15	0.90	4.16	0.93	Agreed
18.	Lack of seminars/workshops on the use of instructional materials in schools	4.83	0.38	4.77	0.44	4.81	0.40	Agreed
19.	High cost of providing instructional materials can affect its availability in colleges	4.58	0.50	4.54	0.52	4.57	0.50	Agreed
20.	Large number of students in the class affects the use of instructional materials	3.79	0.78	3.69	0.75	3.76	0.76	Agreed
	Group Mean	**4.13**		**4.08**		**4.11**		**Agreed**

$\bar{x}_A$= Mean of Administrators, $\bar{x}_T$ = Mean of Teachers, $\boldsymbol{s}_A$= Standard deviation of Administrators, $\boldsymbol{s}_T$ = Standard deviation of Teachers, $\bar{x}_G$= Grand Mean, $\boldsymbol{s}_G$ = Grand Standard deviation, N_A = Number of Administrators, N_T = Number of Teachers

Table 2 answers research question two. The results presented indicated that the respondents agreed with all the items listed as the factors affecting the effective use of instructional materials in teaching of electrical installation and maintenance works trade in Adamawa State technical colleges with a grand mean response of 4.11.

Research Question 3: What are the perception of teachers and administrators on the strategies for improving the use of instructional materials in teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges?

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Table 3: Mean and Standard Deviation of the Perception of Teachers and Administrators on the Strategies for Improving the Use of Instructional Materials

	Respondents: N_A = 24, N_T = 13							
S/N	**ITEMS**	$\bar{x}_A$	$s^2{}_A$	$\bar{x}_T$	$s^2{}_T$	$\bar{x}_G$	$s^2{}_G$	**Remark**
21.	Provision of regular workshops/seminars on the use of instructional materials to teachers	3.96	0.55	3.92	0.64	3.95	0.57	Agreed
22.	Provision of technical support during lesson delivery when instructional materials are in use will improve the use of instructional materials	3.83	0.38	3.77	0.44	3.81	0.40	Agreed
23.	Provision of in-service training to electrical installation and maintenance works trade teachers on the use of instructional materials will improve its usage	4.08	0.50	4.00	0.58	4.05	0.52	Agreed
24.	Provision of adequate number of instructional materials in all technical colleges will improve it usage by the teachers	3.79	0.51	3.77	0.44	3.78	0.48	Agreed
25.	Provision of favorable environment to electrical installation and maintenance works trade teachers will enhance the use of instructional materials	4.21	0.41	4.15	0.38	4.19	0.40	Agreed
26.	Provision of monitoring team for all teaching and learning programs will improve the use of instructional materials in colleges	3.54	0.59	3.46	0.66	3.51	0.61	Agreed
27.	Provision of regular maintenance will enhance instructional material application	3.58	0.93	3.54	1.05	3.57	0.96	Agreed
28.	Provision of modern instructional materials for teaching and learning will improve its usage	4.29	0.91	4.23	1.48	4.27	1.12	Agreed
29.	Provision of welfare to teaching staff on the use of instructional materials will promote the implementation	3.83	0.56	3.77	0.44	3.81	0.52	Agreed
30.	Provision of easy access to instructional materials to teachers will improve the use of instructional materials	3.88	0.34	3.85	0.55	3.86	0.42	Agreed
	Group Mean	**3.90**		**3.85**		**3.88**		**Agreed**

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$\bar{x}_A$= Mean of Administrators, $\bar{x}_T$ = Mean of Teachers, s_A= Standard deviation of Administrators, s_T = Standard deviation of Teachers, $\bar{x}_G$= Grand Mean, s_G = Grand Standard deviation, N_A = Number of Administrators, N_T = Number of Teachers

Table 3 answers research question three. The results presented shows that the respondents agreed with all the items listed as the strategies for improving the use of instructional materials in teaching of electrical installation and maintenance works trade in Adamawa State technical colleges with the grand mean response of 3.88.

Test of Hypotheses

Hypothesis 1: There is no significant difference between the mean perception of teachers and administrators on the use of instructional materials for effective teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges.

Table 4: t – Test Statistical Analysis of Difference between the Mean Responses of the Perception of Teachers and Administrators on the Use of Instructional Materials

Respondents	**N**	$\bar{x}$	**s**	**df**	**P – value**	**Remark**
Teachers	13	3.700	0.451			
				35	0.422	Accepted
Administrators	24	3.796	0.269			

P >0.05 N= Number of respondents, S = Standard Deviation, $\bar{x}$ = Mean

The analysis in Table 4 answered the research hypothesis one. Table 4 revealed that there is no significant difference between the mean perception of teachers and administrators on the use of instructional materials for effective teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges. The opinion was expressed with p –value of = 0.422 which is greater than 0.05 confidence level at 35 degree of freedom. Therefore, HO_1 is accepted.

Hypothesis 2: There is no significant difference between the mean perception of teachers and administrators on the factors affecting the effective use of instructional materials in teaching of electrical installation and maintenance works trade in Adamawa State technical colleges

Table 5: t – Test Statistical Analysis of Difference between the Mean Responses of the Perception of Teachers and Administrators on the Factors Affecting the Effective Use of Instructional Materials

Respondents	**N**	$\bar{x}$	**s**	**df**	**P – value**	**Remark**
Teachers	13	3.862	0.494			
				35	0.360	Accepted
Administrators	24	4.129	0.254			

P >0.05 N= Number of respondents, S = Standard Deviation, $\bar{x}$ = Mean

The analysis in Table 5 answered the research hypothesis two. Table 5 revealed that there is no significant difference between the mean perception of teachers and administrators on the factors affecting the effective use of instructional materials in teaching of electrical installation and maintenance works trade in Adamawa State technical colleges. The opinion

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was expressed with p –value of = 0.360 which is greater than 0.05 confidence level at 35 degree of freedom. Therefore, HO_2 is accepted

Hypothesis 3: There is no significant difference between the mean perception of teachers and administrators on the strategies for improving the use of instructional materials in teaching of electrical installation and maintenance works trade in Adamawa State technical colleges.

Table 6: t-Test Statistical Analysis of Difference between the Mean Responses of the Perception of Teachers and Administrators on the Strategies for Improving the Use of Instructional Materials

Respondents	N	$\bar{x}$	s	df	P – value	Remark
Teachers	13	3.754	0.279			
				35	0.091	Accepted
Administrators	24	3.900	0.225			

P >0.05 N= Number of respondents, S = Standard Deviation, $\bar{x}$ = Mean

The analysis in Table 6 answered the research hypothesis three. Table 6 revealed that there is no significant difference between the mean perception of teachers and administrators on the strategies for improving the use of Instructional materials in teaching of electrical installation and maintenance works trade in Adamawa State technical colleges. The opinion was expressed with p –value of = 0.091 which is greater than 0.05 confidence level at 35 degree of freedom. Therefore, HO_3 is accepted

Findings of the Study

Based on the results presented, the following findings were made:

1. The usefulness of instructional materials includes: making lesson presentation more interesting to the learner, promotes learning, attracting students' attention, contributes in recalling previous experiences.
2. The factors affecting the effective use of instructional materials in teaching of electrical installation and maintenance works trade include: unavailability of trained teachers on the use of instructional materials and lack adequate supervisory services by the school authorities.
3. The strategies for improving the use of instructional materials in teaching of electrical installation and maintenance works trade include: Provision of in-service training and regular workshops/seminars for teachers on the use of instructional materials.
4. There was no significant difference between the mean perception of teachers and administrators on the use of instructional materials for effective teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges
5. There was no significant difference between the mean perception of teachers and administrators on the factors affecting the effective use of instructional materials in teaching of electrical installation and maintenance works trade in Adamawa State technical colleges.
6. There is no significant difference between the mean perception of teachers and administrators on the strategies for improving the use of instructional materials in teaching of electrical installation and maintenance works trade in Adamawa State technical colleges.

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4. DISCUSSION OF FINDINGS

The findings of the study with regard to research question one revealed that the following are the usefulness of instructional materials such as Instructional materials make lesson presentation more interesting to the learner, promotes learning, helps in attracting students' attention during lesson delivery, helps Students in recalling previous experiences among others. However, the supporting hypothesis one revealed that there was no significant difference between the mean perception of teachers and administrators on the use of instructional materials for effective teaching and learning of electrical installation and maintenance works trade in Adamawa State technical colleges. This finding of the study is in tandem with Doosuur and Mwuese (2013) who carried out a study on the use of Instructional resources in Colleges of Education in Benue State with specific reference to the College of Education, Katsina-Ala. Doosuur and Mwuese reported that the use of Instructional materials cannot be overemphasized as the instructional materials combines two senses at a time which are the audio and visual senses. Doosuur and Mwuese maintained that with the combination of the two most important senses in teaching and learning (that is audio and visual senses), the learn space of the students will be very rapid and retention of learned activities will be very high. This finding also supports the report of Igwe (2016) on the effect of instructional materials in teaching basic technology in secondary schools in Onne Local Government Area, Rivers State. Igwe reported that audio visual materials enhance students' performance and help them to become good listeners. Nwike and Catherine (2013) also carried out a research on the effects of use of instructional materials on student's cognitive achievement in Agricultural Science and reported that effective application of instructional materials boosts students' performance and draw their attention to the class activities.

The findings of the study in regard to research question four revealed that the factors affecting the effective use of instructional materials in teaching of electrical installation and maintenance works trade include: unavailability of trained teachers on the use of Instructional materials, teachers' incompetency in the use of Instructional materials, high cost of providing Instructional materials, among others. Furthermore, the supporting hypothesis (hypothesis two) revealed that there was no significant difference between the mean perception of teachers and administrators on the factors affecting the effective use of instructional materials in teaching of electrical installation and maintenance works trade in Adamawa State technical colleges. The finding of the study is in agreement with Bulama, Cyril, Shambirnaah, and Yerima (2018). Bulama, Cyril, Shambirnaah, and Yerima reported that the constrain of using any gadget in the teaching and learning situation relied on the ability of the user to manipulate and maintain the gadgets. But in a situation whereby these skills are lacking, the use of such a gadget will be void. Furthermore, Adamu and Ibrahim (2018) reported that high cost of providing the Instructional materials, poor electricity supply and obsolete nature of the gadget may constitute obstacle to the use of Instructional materials in teaching and learning.

The findings of the study with regard to research question five revealed that the strategies for improving the use of instructional materials in teaching of electrical installation and maintenance works trade include: Provision of in-service training and regular workshops/seminars on the use of Instructional materials to teachers, Provision of technical support during lesson delivery, among others. Furthermore, the supporting hypothesis three revealed that there is no significant difference between the mean perception of teachers and administrators on the strategies for improving the use of instructional materials in teaching of

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electrical installation and maintenance works trade in Adamawa State technical colleges. This finding of the study is in agreement with Naseebullah and Sajiola (2019) who conducted research study on teacher's perception regarding the effectiveness of Instructional materials at secondary school level in Pakistan suggested that with the right training, teachers will be learning how to use the Instructional materials and also apply them in the teaching and learning situation they are engaged in. Abubakar, Arilesere and Oluranti (2021) suggested that the training and re-training of teacher on the use of Instructional materials will help the teacher have confidence while teaching using Instructional because they have acquired the necessary skills.

5. CONCLUSION

The study concluded that the use of instructional materials making lesson presentation more interesting to the learner, helps in attracting students' attention during lesson delivery, helps students in recalling previous experiences among others. However, the study identified the following as the factors that hinders the use of instructional material which are unavailability of trained teachers on the use of instructional materials, teachers' incompetency in the use of Instructional materials, high cost of providing instructional materials, among others. Finally, the study suggested that the strategies for improving the use of instructional materials, Provision of in-service training and regular workshops/seminars on the use of Instructional materials to teachers, provision of technical support during lesson delivery, among others.

Recommendations

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

1. Ministry of Education should encourage teachers to make good use of the available instructional materials to make teaching and learning more interesting and simple for learners.
2. Government should encourage electrical installation and maintenance works trade teachers to go for in-service training in order to update their knowledge and skills in the use of instructional materials
3. Technical College administrators through the Ministry of Education should partner with other donor agencies and individuals for the training and re-training of teaching staff on the skill needs on the use of instructional materials through seminars and workshops.

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