

An Assessment of the Electrical Safety Awareness of Senior Secondary School Students

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Abstract

This paper examined the level of knowledge of secondary school students of electrical safety at home and in the school laboratory. Random sampling technique was used to select 400 students from six secondary schools in Benin City, Edo State. The collated questionnaire was then analyzed. The investigation revealed the following: That the students have a considerably fair knowledge of electrical safety both at home and in the laboratory. The arts students possess a greater knowledge of electrical safety than the science students. The female students possess a considerably better knowledge of electrical safety compared to their male counterparts. Based on these findings some recommendations are made.

Keywords: electrical safety, awareness, secondary schools, tertiary institutions, survey.

1. Introduction

Electricity energy is an essential part of our life because it is the main source of an economic and social development as well as poverty reduction in our country and every other sector centre around it for growth [1]. However, it has the potential to cause great harm. It is a fact that electricity is dangerous and can cause accidents in our homes. With the increased dependency on electricity in every facet of life, electrical safety becomes imperative. We use electricity to carry out a large range of everyday activities such as cooking, cleaning, heating and lighting our homes, as well as powering industrial plants for the manufacture of goods for local use and export.

Electricity is a clean, quiet and invisible source of energy [2]. The fact that it is invisible means we often take it for granted and its inherent dangers are not always immediately apparent. Every year in Nigeria, electricity kills or seriously injures a considerable number of people. Most of these injuries occur through lack of knowledge of electricity and its dangers. The Utility Company continues to be concerned by young adolescents' and the old ignorance of electrical safety and the consequent risk of personal injury and death from electrocution by interfering with power lines and electrical equipment. It is evident that majority of the young people have no idea of the danger they put themselves and others when they carry out these activities. A large part of any system installation is concerned with ensuring that accidents will not happen, or if they do, their effect will be minimal. The home and laboratory appliances most often involved in electrical fires are electric stoves, ovens and dryers, electric pressing irons, refrigerators, central heating units, fans, soldering irons, toasters, washing machines, food processors, electric kettles and frying pans. Some of these fires are caused by electrical system failures, defects, misuse, lack of maintenance, incorrectly installed wiring, overloaded circuits and extension cords. The use of bad or wrong tools can also be a source of hazard.

An exposed live conductor has no insulation that will confine the flow of current to its body; thus, any contact will lead to electric shock, electrocution and possible fire outbreaks. When an electrical apparatus is installed without sufficient ventilation, it is likely to overheat and this can eventually result to electrical fire. In order that there would be no danger from fire caused by electricity, the Institution of Electrical Engineers formulated rules and regulations guiding installations [3].

Though electricity has contributed a lot toward our modern civilization and day-to-day living, a slight mishandling can cause fatal accident. The lowest voltage at which death occurs from electric shock is 110volt [4]. This underscores the need for electrical safety in our homes to prevent hazards happening to our children.

Electricity can kill or severely injure people and cause damage to property [5]. Even non-fatal shocks can cause severe and permanent injury. Most of these accidents can be avoided by careful planning and straightforward precautions not only in the home but also at school in the science laboratories and workshops. Workshops, by nature, are potentially hazardous places. Alertness and safe precautions, it is against this backdrop that this study was designed. Generally, proper laboratory behavior demands that students do not play pranks that may go wrong and cause injury in the course of carrying out laboratory experiments involving electrical devices.

In the literature, descriptive research and survey are used interchangeably. In [6], the researcher stated that descriptive study aims at providing accurate quantitative description of a phenomenon rather than discovering the cause of it.

2. Research Methodology

The research design used for this study is the survey. The study population consists of senior secondary school teenagers students (i.e. classes 1-3), between the ages of 14

and 18 on the average, with a majority of them being from Edo State. To get the participants for this study, a multi-stage random sampling technique was used for selecting the students (400 in all). The first level of sampling was the school. This was followed by a random sampling of the students from each school. Equal number of male and female students (200 each) was chosen. Based on the desired characteristics of the variables, the researchers grouped the students into science, arts and technical.

Data collection methods used in descriptive research includes observation, interviews and questionnaire. For the purpose of this research, a questionnaire was designed, because it is a useful tool for collecting data from a large sample or population as it is cheap, rapid and efficient. According to [7], the questionnaire is the most common research instrument.

A questionnaire is a research instrument consisting of a series of questions and other prompts in a set format, for the purpose of gathering information from respondents on the sample. The questionnaire used consists of three sections: 'A', 'B' and 'C'. Section 'A' was designed to gather personal data about each respondent, while sections 'B' and 'C' consist of statements which were intended to assess secondary school students' attitude towards electrical safety. Section 'B' consists of close-ended questions on a dichotomous scale where the respondent is expected to choose one of two options as a response to a question e.g., "YES" or "NO". The respondents were expected to simply tick the box representing any of the two items they prefer for a response.

Section 'C' consists of a few unstructured open-ended questions where the respondents are expected to formulate their own responses to the question in a short sentence.

The questionnaire was discussed with an expert in the research field who evaluated it for face and content validity. In [8], the researchers stated that: face validity is a judgment that the items measured appear to be relevant while the content validity evidence establishes the relationship between items content and what they are intended to measure. The content validity entails a careful examination of the items and checking through the use of experts in the field concerned, whether the items cover the questionnaire, whether they are clear or are relevant to the attitude being tested [9]. This was considered assured in this study. In this study, the instrument was given to the same group of students twice and the time interval used was one-month, this supports what the researcher proposed in [10]. The reliability coefficient obtained was 0.83 and this indicates that the instrument is reliable.

3. Data Collection

Data was collected from the selected schools after obtaining permission from the school principals to conduct the research. The students were informed that their participation in the research was voluntary. The purpose of the study was explained to them.

It took two weeks to conduct the whole study in Benin City. The questionnaire forms were distributed and the respondents were assured of anonymity. The respondents were told that the questionnaire should be completed without discussion with other respondents. They were encouraged to ask questions for clarification and to be at ease and be relaxed because there is no right or wrong answer to the items. The completed questionnaire forms were collected on the same day (400 in all). The retest was administered a month later to the same students.

4. Results and Discussions

This section deals with the results and discussion of the findings of the study. It provides answers to the research questions and hypotheses. Also, the results were interpreted to shed light on the findings. The results are presented according to each research question.

The responses to research questions such as *how much do secondary school students know about electrical safety?*, and *are there differences between male and female students in their knowledge of electrical safety measures?* are presented in Table 1.

Also response to *are there differences in knowledge of electrical safety measures between science-oriented students and liberal arts students?* are presented in Table 2.

Total number of secondary school students who participated in the study is 400. The number and percentage (in parenthesis) of students who answered “YES” to a particular question are presented on the right column immediately after the number of respondents and those that answered ‘NO’ are presented in the next column in the same manner.

The items were arranged on the basis of percentage in descending order of magnitude for the positive items and the reverse for the negative items which resulted in the overall profile of ‘All Students’ as shown in Table 1.

The analysis in Table 1 shows that the knowledge of electrical safety by students in Benin City is considerably fair. This means that the students have knowledge of electrical safety at home and in the laboratory. For instance, in the students’ response to the second question, that is, *Do you study the manufacturer’s operating manual before installing and using any electrical appliance?*, a great percentage of the students responded ‘YES’ (87.75%) compared to those that responded ‘NO’ (12.25%). Conversely, only a few students responded “YES” (3.75%) to the question “*Do you touch electrical gadgets with wet hands?*” compared to the large number of students that responded “NO” (96.25%) to the same question. This suggests that the knowledge of electrical safety available to the students is generally high.

There were 200 male and 200 female (equal number) secondary school student respondents drawn from the selected schools in Benin City and the results is presented in Table 1. The outcome of the analysis in Table 1 indicates that there exist some considerable differences between male and female students in their knowledge of electrical safety measures.

For instance, to the question *Do you switch off affected sockets and pick up wires from the ground when washing or moping the floor of your house?*, the responses of the male students were 65.50% “YES” and 34.50% “NO” while that of the female students were 78.50% “YES” and 21.50% “NO”. Again, to the question, *Do you use electrical outlets or switches with broken, cracked or missing protective covers?*, the responses of the male students were 16.00% “YES” and 74.00% “NO” compared to the female students’ 14.50% “YES” and 85.50% “NO”. Finally, to the question, *Do you use electrical appliances with broken parts and naked (exposed) wires as long as they are functioning?*” the responses of the male students were 12.50% “YES” and 87.50% “NO” compared to the female responses of 20.00% “YES” and 80.00% “NO”. To further test the hypothesis in this study we applied statistics [11], chi-squared test [12] presented in Table 3, using a significance level of 5%. The chi-squared value calculated was 12.933 and using nine degrees of freedom, the critical value of chi-squared was 16.92. Thus no significant difference between the expected and observed data and as such there is differences between male and female students in their knowledge of electrical safety measures. On the other hand, if each item was considered separately, it can be noted that items 1, 2 and 4 in Table 3 has no significant difference for one degree of freedom and with a critical value of 3.841 for significance level of 5%, while items 3 and 5 have larger frequencies than would have been expected.

The above findings show that the female students have a considerably better knowledge, as well as positive attitude towards electrical safety compared to their male counterparts.

Total number of secondary school students who indicated science as their field of interest was 189; those that indicated arts as their field of interest 104, and technical 107. These are presented in Table 2 in the same manner as that of Table 1.

The outcome of the analysis in Table 2 shows that there are some differences in the knowledge of electrical safety between science students and liberal arts students. Both science and technical students are considered here as science-oriented students as what they study at this level are quite similar. However, for the purpose of analysis we will consider them differently.

Table 1: Responses to items on electrical safety measures by secondary school students, male students and female students

S/N	Items	All Students			Male Students			Female Students		
		N	Yes	No	N	Yes	No	N	Yes	No
1	Have you heard about electrical shock before?	400	365 (91.25)	35 (8.75)	200	181 (90.50)	19 (9.50)	200	184 (92.00)	16 (8.00)
2	Do you study the manufacturer’s operating manual before installing and using any electrical appliance?	400	351 (87.75)	49 (12.25)	200	177 (88.50)	23 (11.50)	200	174 (87.00)	26 (13.00)
3	Do you think you possess some knowledge on electrical safety?	400	345 (86.25)	55 (13.75)	200	154 (77.00)	46 (23.00)	200	170 (85.00)	30 (15.00)

4	Do you put 'off' the main electrical switch when carrying out electrical repairs in your home?	400	336 (84.00)	64 (16.00)	200	154 (77.00)	46 (23.00)	200	196 (98.00)	4 (2.00)
5	Do you operate all your electrical appliances according to the manufacturer's instructions?	400	333 (83.25)	67 (16.75)	200	178 (89.00)	22 (11.00)	200	155 (77.50)	45 (22.50)
6	Have you ever experienced any form of electrical shock?	400	310 (77.50)	90 (22.50)	200	157 (78.50)	43 (21.50)	200	194 (97.00)	6 (3.00)
7	Do you educate other people on electrical safety?	400	307 (76.75)	93 (23.25)	200	141 (70.50)	59 (29.50)	200	166 (83.00)	34 (17.00)
8	Do you switch off affected sockets and pick up wires from the ground when washing or mopping the floor of your house?	400	288 (72.00)	112 (28.00)	200	131 (65.50)	69 (34.50)	200	157 (78.50)	43 (21.50)
9	Have you ever been taught lessons in electrical safety rules and procedures?	400	275 (68.75)	125 (31.25)	200	155 (77.50)	45 (22.50)	200	120 (60.00)	80 (40.00)
10	Do you think the human body can conduct electricity?	400	225 (56.25)	175 (43.78)	200	113 (56.50)	87 (43.50)	200	112 (56.00)	88 (44.00)
11	Do you know if the electrical wiring of the house you live in is connected to earth?	400	205 (51.25)	195 (48.75)	200	84 (42.00)	116 (58.00)	200	121 (60.50)	79 (39.50)
12	Is it safe to block unoccupied/unused sockets?	400	192 (48.00)	208 (52.00)	200	87 (43.50)	113 (56.50)	200	188 (94.00)	12 (6.00)
13	Do you stick objects into the holes of electrical sockets?	400	133 (33.25)	267 (66.78)	200	76 (38.00)	124 (62.00)	200	57 (33.25)	143 (66.78)
14	Do you sometimes leave electrical appliances switched 'on' when you are not using them?	400	121 (30.25)	279 (69.75)	200	71 (35.00)	129 (65.00)	200	50 (25.00)	150 (75.00)
15	Do you leave your electrical appliances switched 'on' when leaving home?	400	91 (22.75)	309 (77.25)	200	46 (23.00)	154 (77.00)	200	45 (22.50)	155 (77.50)
16	Is it safe to run extension cords under rugs or furniture at home?	400	87 (21.75)	313 (78.25)	200	45 (22.50)	155 (77.50)	200	29 (14.50)	171 (85.50)
17	Is it better to lift up or carry portable devices by their cords instead of using the handles?	400	79 (19.75)	321 (80.25)	200	36 (18.00)	164 (82.00)	200	43 (21.50)	157 (78.50)
18	Do you operate electrical machines in the school without permission from an instructor?	400	66 (16.50)	334 (83.50)	200	42 (21.00)	158 (79.00)	200	24 (12.00)	176 (88.00)
19	Do you use electrical outlets or switches with broken, cracked or missing protective covers?	400	65 (16.25)	335 (83.75)	200	32 (16.00)	168 (84.00)	200	29 (14.50)	171 (85.50)
20	Do you use electrical appliances with broken parts and naked (exposed) wires as long as they are functioning?	400	63 (15.75)	337 (84.25)	200	25 (12.50)	175 (87.50)	200	40 (20.00)	160 (80.00)
21	Do you load an adapter or wall socket with many appliances?	400	50 (12.50)	350 (87.50)	200	29 (14.50)	171 (85.50)	200	21 (10.50)	179 (89.50)
22	Do you unplug electrical appliances by pulling on the cord instead of the plug?	400	44 (11.00)	356 (89.00)	200	25 (12.50)	175 (87.50)	200	19 (9.50)	181 (90.50)
23	Do you engage in rough play in the laboratory?	400	43 (10.75)	357 (89.25)	200	13 (6.50)	187 (93.50)	200	30 (15.00)	170 (85.00)
24	Do you place burning candles on top of electrical gadgets?	400	25 (6.25)	375 (93.75)	200	8 (4.00)	192 (96.00)	200	2 (1.00)	198 (99.00)
25	Do you touch electrical gadgets with wet hands?	400	15 (3.75)	385 (96.25)	200	7 (3.50)	193 (96.50)	200	8 (4.00)	192 (96.00)

Table 2: Responses to electrical safety by science, arts and technical students.

S/N	Items	Science Students			Arts Students			Technical Students		
		N	YES	NO	N	YES	NO	N	YES	NO
1	Have you heard about electrical shock before?	189	173 (91.53)	16 (8.47)	104	97 (93.27)	7 (6.73)	107	95 (88.79)	12 (11.21)
2	Do you study the manufacture of electrical appliances before installing and using any?	189	171 (90.48)	18 (9.52)	104	91 (87.50)	13 (12.50)	107	89 (83.17)	18 (16.83)
3	Do you think you possess some knowledge on electrical safety?	189	170 (89.95)	19 (10.05)	104	87 (83.65)	17 (16.35)	107	88 (82.24)	19 (17.76)
4	Do you put "off" the main electrical switch when carrying out electrical repairs in your home?	189	154 (81.48)	35 (18.52)	104	89 (85.58)	15 (14.42)	107	93 (86.92)	14 (13.08)
5	Do you operate all your electrical appliances according to the manufacturer's instructions?	189	152 (80.42)	37 (19.58)	104	86 (82.69)	18 (17.31)	107	95 (88.79)	12 (11.21)
6	Have you ever experienced any electrical shock?	189	151 (79.90)	38 (20.10)	104	83 (79.81)	21 (20.19)	107	78 (72.90)	29 (27.10)
7	Do you educate other people on electrical safety?	189	100 (52.91)	89 (47.09)	104	83 (79.81)	21 (20.19)	107	79 (73.83)	28 (26.17)
8	Do you switch off affected sockets and pick up wires from the ground when washing or mopping the floor?	189	136 (71.96)	53 (28.04)	104	74 (71.15)	30 (28.85)	107	82 (76.64)	25 (23.36)
9	Have you ever been taught lessons in electrical safety rules and procedures?	189	141 (74.60)	48 (25.40)	104	70 (67.31)	34 (32.69)	107	66 (61.68)	41 (38.32)

10	Do you think the human body can conduct electricity?	189	95 (50.26)	94 (49.79)	104	61 (58.65)	43 (41.35)	107	69 (64.49)	38 (35.51)
11	Do you know if the electrical wiring of the house you live in is put to earth?	189	97 (51.32)	92 (48.68)	104	49 (47.12)	55 (52.88)	107	59 (55.14)	48 (44.86)
12	Is it safe to block unoccupied/unused sockets?	189	91 (48.15)	98 (51.85)	104	52 (50.00)	52 (50.00)	107	49 (45.79)	58 (54.21)
13	Do you stick objects into the holes of electrical sockets?	189	55 (29.10)	134 (70.90)	104	42 (40.38)	62 (59.62)	107	36 (34.64)	71 (66.36)
14	Do you sometimes leave electrical appliances switched 'on' when you are not using them?	189	51 (26.98)	138 (73.02)	104	34 (32.69)	70 (67.31)	107	36 (34.64)	71 (66.36)
15	Do you leave your electrical appliances switched 'on' when leaving home?	189	34 (18.00)	155 (82.00)	104	26 (25.00)	78 (75.00)	107	31 (28.97)	76 (71.03)
16	Is it safe to run extension cords under rugs or furniture at home?	189	63 (33.33)	126 (66.67)	104	8 (7.69)	96 (92.31)	107	16 (14.95)	91 (85.05)
17	Is it better to lift up or carry portable devices by their cords instead of using the handles?	189	31 (16.40)	158 (83.60)	104	22 (21.15)	82 (78.85)	107	26 (24.29)	81 (75.71)
18	Do you operate electrical machines in the school without permission from an instructor?	189	42 (22.22)	147 (77.78)	104	4 (3.85)	100 (96.15)	107	20 (18.69)	87 (81.31)
19	Do you use electrical outlets or switches with broken, cracked or missing protective covers?	189	28 (14.81)	161 (85.19)	104	18 (17.31)	86 (82.69)	107	19 (17.76)	88 (82.24)

20	Do you use electrical appliances with broken parts and naked (exposed) wires as long as they are	189	27 (14.29)	162 (85.71)	104	16 (15.38)	88 (84.62)	107	20 (18.69)	87 (81.31)
21	Do you load an adapter or wall socket with many appliances?	189	19 (10.05)	170 (89.95)	104	15 (14.42)	89 (85.50)	107	16 (14.95)	91 (85.05)
22	Do you unplug electrical appliances by pulling on the cord instead of the plug?	189	20 (10.58)	169 (89.42)	104	12 (11.54)	92 (88.46)	107	12 (11.21)	95 (88.79)
23	Do you engage in rough play in the laboratory?	189	15 (7.94)	174 (92.06)	104	11 (10.58)	93 (89.42)	107	17 (15.89)	90 (84.11)
24	Do you place burning candles on top of electrical gadgets?	189	10 (5.29)	179 (94.71)	104	5 (4.81)	99 (95.19)	107	10 (9.35)	97 (90.65)
25	Do you touch electrical gadgets with wet hands?	189	6 (3.17)	183 (96.83)	104	8 (7.69)	96 (92.31)	107	6 (7.69)	101 (92.31)

Table 3: Chi-square analysis for some items based on Table 1.

Items		Observed (O)			Expected (E)			$(O - E)^2 / E$		$\sum (O - E)^2 / E$	Individual question χ^2
		Male	Female	Total	Male	Female	Male	Female			
Do you study manufacturer's operating manual before installing and using any electrical appliance?	Yes	177	174	351	175.5	175.5	0.013	0.013	0.026	0.210	
	No	23	26	49	24.5	24.5	0.092	0.092	0.184		
Do you touch	Yes	7	8	15	7.5	7.5	0.033	0.033	0.066		

electrical gadgets with wet hands?	No	193	192	385	192.5	192.5	0.001	0.001	0.001	0.067
Do you switch off affected sockets and pick up wires from the ground when washing or mopping the floor of your house?	Yes	131	157	288	144	144	1.174	1.174	2.348	
	No	69	43	112	56	56	3.018	3.018	6.036	8.384
Do you use electrical outlets or switches with broken, cracked or missing protective covers?	Yes	32	29	61	30.5	30.5	0.074	0.074	0.148	
	No	168	171	339	169.5	169.5	0.013	0.013	0.026	0.174
Do you use electrical appliances with broken parts and naked (exposed) wires as long as they are functioning?	Yes	25	40	65	32.5	32.5	1.731	1.731	3.426	
	No	175	160	335	167.5	167.5	0.336	0.336	0.672	4.098
									$\chi^2 = 12.93$	

Table 4: Chi-square analysis for some items based on Table 2.

Items		Observed (O)				Expected (E)			$(O - E)^2 / E$			$\sum \frac{(O - E)^2}{E}$	Individual question χ^2
		Science	Arts	Technical	Total	Science	Arts	Technical	Science	Arts	Technical		
Do you study manufacturer's operating manual before installing and using any electrical appliance?	Yes	171	91	89	351	165.85	91.26	93.89	0.16	0.0007	0.25	0.4107	
	No	18	13	18	49	23.15	12.74	13.10	1.15	0.005	1.83	2.985	3.396

Do you touch electrical gadgets with wet hands?	Yes	6	8	6	20	9.45	5.20	5.35	1.25	1.51	0.079	2.839	
	No	183	96	101	380	179.55	98.80	101.65	0.07	0.08	0.004	0.154	2.993
Have you ever been taught lessons in electrical safety rules and procedures?	Yes	141	70	66	277	130.88	72.02	74.10	0.783	0.057	0.885	1.725	
	No	48	34	41	123	58.12	31.98	32.90	1.762	0.128	1.994	3.884	5.609
Do you operate electrical machines in the school without permission from an instructor?	Yes	42	4	20	66	31.18	17.16	17.66	3.755	10.092	0.310	14.157	
	No	147	100	87	334	157.82	86.84	89.34	0.742	1.994	0.061	2.797	16.954
Do you place burning candles on top of electrical gadgets?	Yes	10	5	10	25	11.81	6.5	6.69	0.277	0.346	1.638	2.261	
	No	179	99	97	5	177.19	97.5	100.31	0.018	0.023	0.109	0.150	2.411
											χ^2		
											= 31.		

For instance, to the question, *Have you ever been taught lessons on electrical safety rules and procedures?* the responses of the science students were 74.60% for “YES” and 25.40% for “NO”, technical students, 61.68% for “YES” and 38.32% for “NO”, while those of the art students have 67.31% for “YES” and 32.69% for “NO”, which shows that the science students have more exposure to electrical safety measure which may enhance their knowledge of electrical safety as compared to their arts and technical counterparts. Again, the responses of these students to the question, *Do you operate electrical machines in the school without permission from your instructor?* were 22.22% for “YES” and 77.78% for “NO” for the science students and 18.69% for “YES” and 81.31% for “NO” for the technical students while that of the art students

was 3.85% for “YES” and 96.15% for “NO” . This shows that the science and technical students have an attitude of being “over-familiar” with electricity resulting in their neglecting other electrical safety rules such as the one expressed in the question above. This was stated in [13], where the researcher suggested that people tend to neglect safety measures despite the unique form of different hazards encountered. Also, there is the issue of the individual’s conscience to choose what is right, according to the rules but choose to do the opposite [14].

The response to the question, *Do you place burning candles on top of electrical gadgets?* the responses were 5.29% for “YES” and 96.83% for “NO” for the science students and 9.35% for “YES” and 90.65% for “NO” for the technical students while that of the arts students was 4.81% for “YES” and 95.19% for “NO”. This shows that these categories of students possess a general knowledge of electrical safety. Generally there is a pattern that shows the arts students as more cautious in handling electrical equipment and environments than their science or technical students. To further test the hypothesis in this study, chi-squared test is applied as shown in Table 4, using a significance level of 5%. The chi-squared value calculated was 31.336 and using eighteen degrees of freedom, the critical value of chi-squared was 28.87. Thus there is significant difference between the expected and observed data. Looking at the items individually, it can be noted that the major lack of fitness comes from items 3 and 4 of Table 4. On the other hand, if each item was considered separately, it can be seen that items 1, 2 and 5 in Table 4 has no significant difference for one degree of freedom with a critical value of 3.841 for significance level of 5%. It also indicates that items 3 and 4 have much larger frequencies than would have been expected if there had been no association.

5. Conclusion and Recommendation

This section deals with the conclusion and recommendations arising from the findings of this study.

5.1 Conclusion

A sample of 400 students with an equal number of male and female students was drawn from six schools. The instrument was a questionnaire containing free response options with Yes/No items. The data was collected and analyzed.

Based on the result of this investigation, it can be concluded that secondary school students in the selected schools in Benin City, Edo State, Nigeria have a positive attitude towards electrical safety. The students’ gender and field of interest are influencing factors.

Therefore the implementation of electrical and general laboratory safety education in secondary schools would reduce electrical hazards and thus reduce electrocution, injury and death.

5.2 Recommendation

In this research, it was found that students from the selected schools in Benin City, Edo State have a general knowledge of electrical safety. However, the basic knowledge is lacking in most of the observed respondents. As a result of these findings, the following recommendations are made:

- Workshops and seminars should be organized periodically to train and educate secondary school students on the importance of electrical safety measures as well as to equip them with the necessary skills in handling minor electrical problems at home and in the school laboratory.
- There should be massive provision of teaching and learning facilities and adequate maintenance of existing ones, as well as ensuring that electrical installations in use are in good working conditions to prevent electrical hazards.
- Safety education should be an integral part of technology instruction in all secondary schools in Benin City, Edo State and Nigeria in general.
- Each school's department of science should have its own Health and Safety Committee that is expected to meet regularly to assess the health and safety situations in the school laboratories, and to make recommendations or improvements and courses of action.
- It is incumbent on staff and students to develop safety awareness as part of any experimental work undertaken. Safe systems of work and learning will only be successful if individuals observe these requirements at all times.
- The following information will be of importance to the actualization of the recommendations:
 - The action to be taken in the case of fire, explosions or flooding (such as on workshop notices and in the school's policy) should be clearly displayed or positioned.
 - Safety posters should be displayed in each workshop.
 - The school's Code of Practice should be displayed near the appropriate equipment.
 - Literature on safety should be made available in workshops, laboratories and the school's library.
 - It is of great importance that all users of the science laboratories and workshop areas adhere strictly to all instructions given by the attendant or technical staff in charge of the laboratory or workshop.
 - Any equipment one has not has instruction on and received explicit permission to use should not be used as some of them may be faulty and their usage may be detrimental.
 - It is illegal as well as dangerous to operate an inadequately guarded machine.
 - It is advisable to report any electrical defect in an electrical device in the laboratory to the technician in charge for appropriate action.

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