

## **Evaluations of the Effect of Workshop/Laboratory Accidents and Precautionary Steps towards Safety Practice”**

<sup>1</sup>Osang, Jonathan Eyire, <sup>2</sup> Obi, Emmanuel O, <sup>3</sup> Ewona, Igwe O.  
*Cross River State University Of Technology, Nigeria. (That Is, Three Persons)*

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**Abstract:** A good number of scientist, engineers, laboratory or workshop users have lost their lives and the lives of others due to accidents in the workshop caused by ignorance, neglect or carelessness. This paper focus on the incident and prevalence rate of workshop and laboratory accidents in twenty (20) schools within Cross River State, Nigeria. The investigation took place between January 2008 and December 2012 (a period of five years). A total of 66 departments were investigated. The data was source with the help of the technologist and head of Department of each of the schools. Based on these data, using descriptive analysis, multiple bar chart and Trend analysis (Analysis of variance-SPSS) to show the growth and decline of laboratory or workshop accidents across various departments over the years of study. The result revealed that the average number of accidents occurred most in chemistry department; UNICAL and CRUTECH at 25 and 18 respectively, (table 1 and 2). And that of 18 secondary schools indicated that Bekwara Local Government Area was the highest numbers of accidents (20.0) table 3, while Biase Local Government Area had the least (10.2), physics and biology had recorded less accidents (table 3). In the two universities, computer/Maths statistic Department had less laboratory accident due to not being exposed to heavy chemical. Hence, from this result, 40 workshop safety and precautionary steps are release to avoid or minimize accidents in the laboratory or workshop towards a healthy carrier.

**Key Word:** workshop accidents, Technology, Scientist, Engineers, Safety and precautions

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### **I. Introduction**

Over the year, both in develop and developing countries, technology has been a standard of differentiating factor between countries state, organizations and individual irrespective of the colour, culture or language. And as such, technology depends on the quality of scientist, engineers, and laboratory or workshop users. Technology can never be successful without the workshop, laboratory or tools. According to Thomas Carlyle, man without tools is nothing, with tool he is all, this statement elaborated the important of tooling to a man.

The important of laboratory workshop and tools cannot be over emphases. Move over, research have it that, the workshop or laboratory claim too many victims (lives) in the process of carrying out research or during the use of machines. Over 70% of these accidents are caused by neglect, carelessness or ignorance on the part of the scientist, engineer, (student) or a colleague in the workshop or laboratory.

In 2008, a first year student in Cross River University of technology-Nigeria was rushed to the hospital during a practical experiment in chemistry laboratory due to an exploration which was wrongly mixed by self. In 2010, a final year student in Boki comprehensive secondary school Okundi was badly injured during a practical class by a friend who was terribly drunk.

That not withstanding, a good number of scientist, engineer, a laboratory or workshop user have lost their hands, legs, eyes, ears, mouth, fingers, carriers, marriages, jobs, education, friends, their lives and the lives of others due to neglect, carelessness or ignorance of laboratory or workshop safety and precautions in cases of accidents.

### **II. Radioactive Hazards In The Laboratory**

In the workshop/Laboratory, Radioactive contamination is also called radiological contamination. It is the deposition of or presence of radioactive substance on surface or within solids, liquids, or gases (including the human body), where their presence is unintended or undesirable. Such contamination presents a hazard because of the radioactive decay of the contaminants, which emit harmful ionizing radiation such as alpha or beta particles, gamma rays or neutrons. The degree of hazard is determined by the concentration of the contaminants, the energy of the radiation being emitted, the type of radiation and the proximity of the contamination to organs of the body. It is very important to be clear that the contamination gives rise to the radiation hazard, and the terms radiation and contamination are not interchangeable. Contamination may affect a person, a place, environment, animal, an object such as clothing.

Radiation contamination is typically the result of a spill or accident during the production, or use of radionuclides (radioisotopes). Clearing up contamination result in radioactive waste. If a person's body is contaminated by ingestion or by injury and standard clearing cannot reduce the contamination further, then the person may be permanently contaminated.

Radioactive contamination can enter the body through ingestion, inhalation, absorption or injection. For this reason, it is very important to use personal protective equipment when working with radioactive materials.

### **III. Materials and Method**

#### **Geography of the area:**

Cross River State is one Nigeria's coastal State, located in the south-south region of the county, bordered by the Republic of Cameroon in the East and Nigeria state of Benue (North), Ebonyi and Abia (West) and Akwa Ibom (south-west ). It occupies a total land area of 20,156 square kilometers, lying between latitude  $4^{\circ}28^0$  and  $6^{\circ}55^0$  North of the equator and green wich meridian. It has the average of 2,311297 people. Cross River State was created in May 27, 1967, named for Cross River (Oyono) which passes through the Sate located in the Niger Delta. The State has its capital at Calabar. And is composed of three major ethnic groups, the Efik, the Ejagham and Bekwara. Cross River State is divided into eighteen (18) local Government Area namely; Akpabuyo, Odukpani, Akamkpa, Biase, Ikom, Yarkuur, Obubra, Boki, Ogoja, Calabar-south, Etung, Bekwara, Bakassi, Calabar municipality. Obanliku, Obudu, Yala, Abi.

#### **IV. Method**

The method of analysis to the study on evaluation of the effect of workshop/Laboratory accidents and precautionary steps toward safety practice. The description method of analysis was employed to show and indicate the growth and decline of laboratory accident across various department over the years of study.

Analysis of variance was carried out to study the significance different on the department in the university. Moveover, multiple bar charts and trend analysis was done to show or indicate the movement or growth of laboratory accidents across Local Government Area in the State (Cross River).

#### **Data source:**

Twenty (20) schools were chosen for this study. Two universities in the state (university of Calabar UNICAL and Cross River University of technology-Nigeria (CRUTECH) and eighteen (18) secondary schools in the eighteen (18) local government area in Cross River State, Nigeria. Records of all the accidents that occur (major and minor) through the help of chief laboratory technologist and Head of Department. This was done to investigate the level of workshop laboratory accidents in each of the schools and departments respectively.

#### **DIFINTION OF TERMS**

UNICAL	=	University of Calabar
CRUTECH	=	Cross River University of Technology Nigeria
GTCI	=	Government Technical collage Ikot Nakanda-Akpabuyo L.G.A
GSSO	=	Government secondary school Akpap Okoyong-Odukpani L.G.A
GSSA	=	Government secondary school. Akpanmkpa. L.G.A
GSSB	=	Government secondary school-Biase L.G.A
BSC	=	Bekwara secondary school, Bekwara LGA.
FGCI	=	Federal Government Collage-Ikom L.G.A
BCSSO	=	Boki Comprehensive secondary school-Okundi Boki L.G.A
FSCO	=	Federal Science Collage Ogoja-L.G.A.
GSSIB	=	Government secondary school Ikang-Bakassi L.G.A
CSB	=	Community secondary school Bugwagban Obudu L.G.A
TCO	=	Technical secondary school Obanliku L.G.A
ATCE	=	Ajasson Technical collage Etung L.G.A
MCO	=	Mary knoll Collage Okuku-Yala L.G.A
GSSC	=	Government Secondary School –Henshaw Town. Calabar South
GSSAC	=	Government Science School Akin-Calabar Municipality
SPTU	=	St. Patrick Technical collage Ugep-Yakuur L.G.A
GSSO	=	Government Science School Obubra – L.G.A
ACSSEA	=	Agbo Comprehensive secondary school Egboronyi Abi

**Results:**

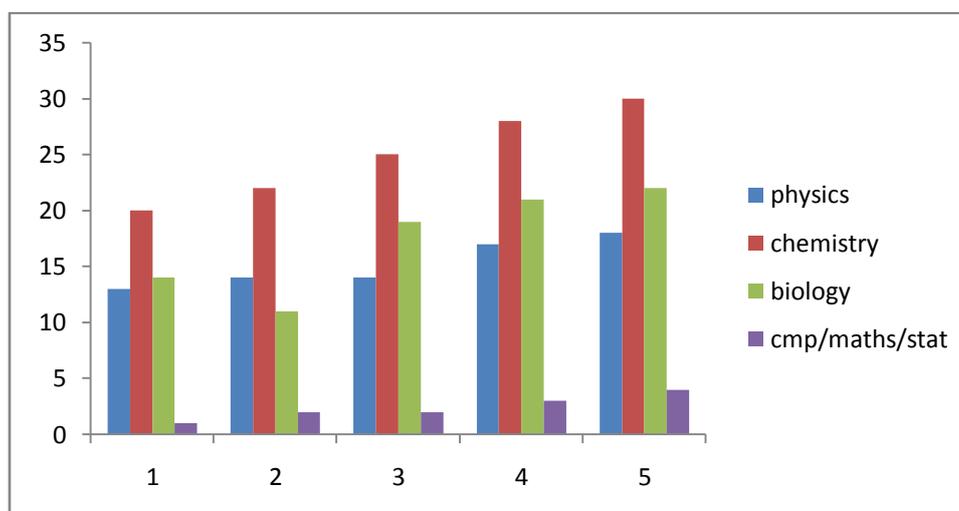
**Table 1. Number Of Workshop/Laboratory Accidents In University Of Calabar**

year	physics	chemistry	biology	comp/maths/stat	TOATAL	MEAN
2008	13	20	14	1	48	12
2009	14	22	11	2	49	12.25
2010	14	25	19	2	60	15
2011	17	28	21	3	69	17.25
2012	18	30	22	4	74	18.5
	76	125	87	12		
MEAN	15.2	25	17.4	2.4		

**Table 2. Anova On Number Of Workshop/ Laboratory Accidents In University Of Calabar**

		Sum of Squares	df	Mean Square	F	Sig.
Physics	Between Groups	18.800	4	4.700	1.175.	
	Within Groups	.000	0			
	Total	18.800	4			
Chemistry	Between Groups	68.000	4	17.000	4.25.	
	Within Groups	.000	0			
	Total	68.000	4			
biology	Between Groups	89.200	4	22.300	5.575.	
	Within Groups	.000	0			
	Total	89.200	4			
cmp/maths/stat	Between Groups	5.200	4	1.300	0.324.	
	Within Groups	.000	0			
	Total	5.200	4			

**Figure 1:THE MULTIPLE COMPARISM BAR CHART OF NUMBER OF WORKSHOP/ LABORATORY ACCIDENTS IN UNIVERSITY OF CALABAR**

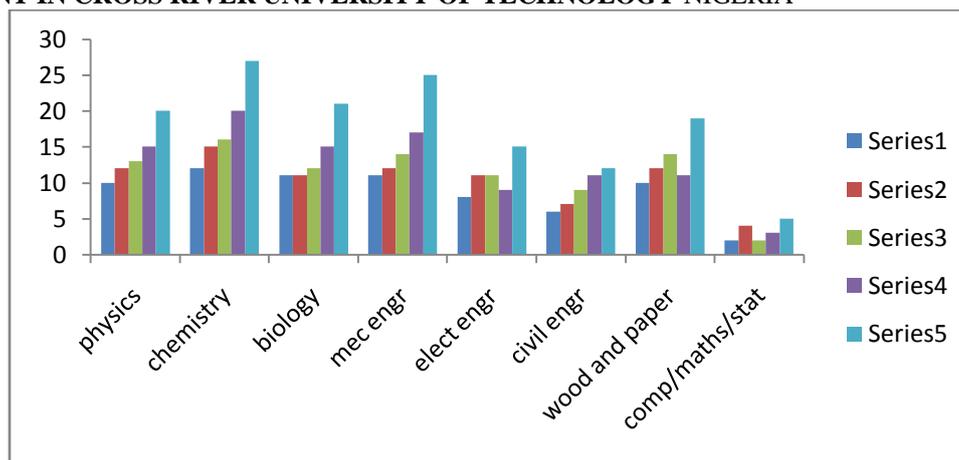


**TABLE 3 NO OF WORKSHOP/LABORATORY ACCIDENT IN CROSS RIVER UNIVERSITY OF TECHNOLOGY**

DEPARTMENT	2008	2009	2010	2011	2012	TOTAL	MEAN
physics	10	12	13	15	20	70	14
chemistry	12	15	16	20	27	90	18
biology	11	11	12	15	21	70	14
mec engr	11	12	14	17	25	79	15.8
elect engr	8	11	11	9	15	54	10.8
civil engr	6	7	9	11	12	45	9
wood and paper	10	12	14	11	19	66	13.2
computer engr	2	4	2	3	5	16	3.2

**Figure 2**

**THE MULTIPLE COMPARISM BAR CHART OF NUMBER OF WORKSHOP/LABORATORY ACCIDENT IN CROSS RIVER UNIVERSITY OF TECHNOLOGY NIGERIA**



**Table 4: No Of Workshop/Laboratory Accidents In 18 Secondary Schools In The 18 Local Government Areas. (Cross River State) Nigeria.**

Secondary Schools	Lab	2008	2009	2010	2011	2012	Total	Mean
Gtci	Physics	10	11	14	13	16	64	12.8
	Chemistry	12	13	12	15	21	73	14.6
	Biology	6	10	15	17	19	67	13.4
Gsso	Physics	11	12	11	13	15	62	12.4
	Chemistry	13	15	16	18	20	82	16.4
	Biology	12	13	13	14	17	69	13.8
Gssa	Physics	11	12	11	11	16	61	12.2
	Chemistry	11	11	13	15	19	69	13.8
	Biology	10	12	14	14	18	68	13.6
Gssb	Physics	6	7	9	10	19	51	10.2
	Chemistry	9	14	19	22	28	92	18.4
	Biology	10	11	11	14	19	65	13
Bsc	Physics	11	12	13	14	15	65	13
	Chemistry	18	19	19	19	30	105	21
	Biology	10	11	11	17	24	73	14.6
Fgci	Physics	10	12	13	9	22	66	13.2
	Chemistry	13	19	21	24	28	105	21
	Biology	13	11	14	15	25	78	15.6
Sptu	Physics	6	7	10	15	16	54	10.8
	Chemistry	11	14	15	16	17	73	14.6
	Biology	7	11	10	14	16	58	11.6
Gsso	Physics	16	12	13	14	16	71	14.2
	Chemistry	14	15	19	21	23	92	18.4
	Biology	10	13	18	17	19	77	15.4
Besso	Physics	11	12	13	15	20	71	14.2

	Chemistry	14	16	20	23	27	100	20
	Biology	10	11	17	17	20	75	15
Fsco	Physics	11	12	13	15	20	71	14.2
	Chemistry	15	16	19	22	24	96	19.2
	Biology	12	13	14	17	21	77	15.4
Gssc	Physics	12	14	15	19	22	82	16.4
	Chemistry	14	17	20	22	26	99	19.8
	Biology	13	15	15	16	21	80	16
Acseaa	Physics	11	12	14	17	20	74	14.8
	Chemistry	13	15	17	18	21	84	16.8
	Biology	10	11	11	15	19	66	13.2
Gssib	Physics	11	15	15	15	18	74	14.8
	Chemistry	12	13	18	21	15	79	15.8
	Biology	11	10	12	13	19	65	13
Csb	Physics	6	10	11	15	19	61	12.2
	Chemistry	9	11	12	16	20	68	13.6
	Biology	8	9	10	12	15	54	10.8
Tco	Physics	10	12	15	16	20	73	14.6
	Chemistry	11	13	15	19	24	82	16.4
	Biology	9	10	15	17	19	70	14
Atce	Physics	11	12	17	20	22	82	16.4
	Chemistry	13	15	19	23	29	99	19.8
	Biology	10	11	12	21	24	78	15.6
Mco	Physics	6	7	10	13	17	53	10.6
	Chemistry	10	13	15	19	20	77	15.4
	Biology	7	10	11	14	18	60	12
Gssac	Physics	9	11	15	16	17	68	13.6
	Chemistry	12	15	19	18	21	85	17
	Biology	11	13	14	15	19	72	14.4

Figure 3

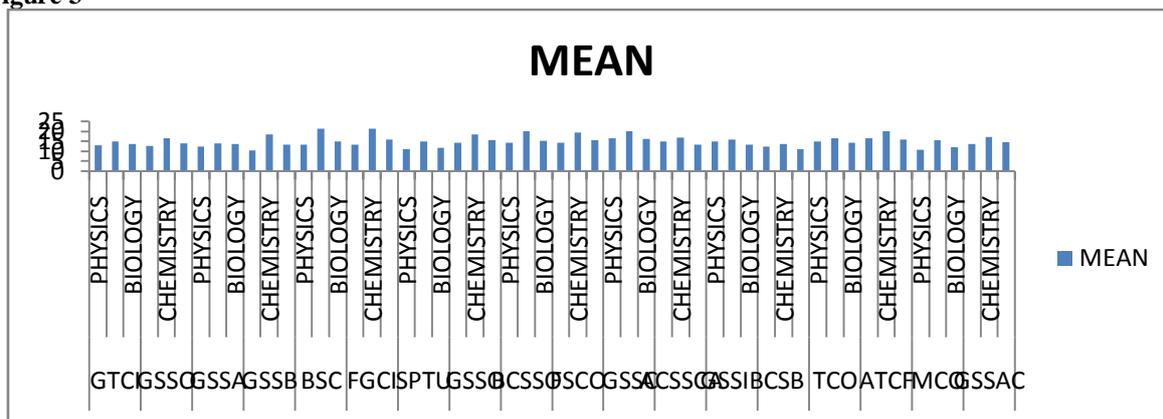
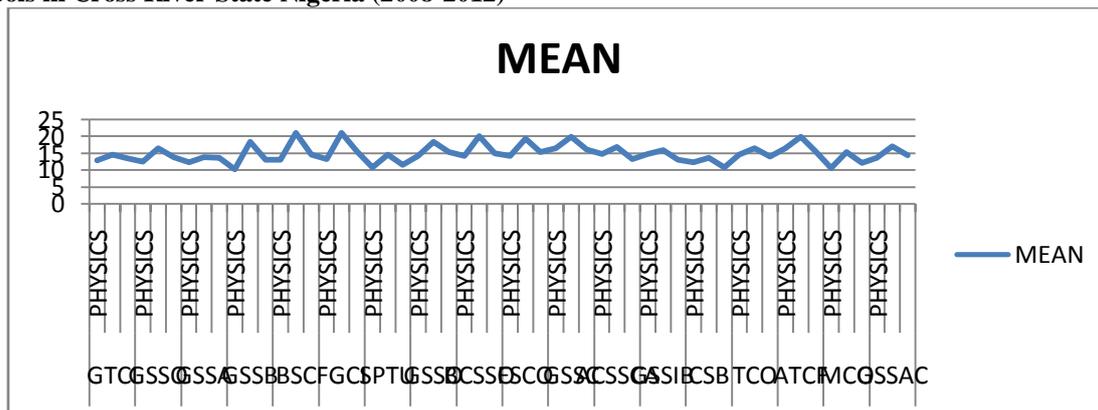


Figure 4: The trend (average) accident occurrence within the 18 local Government Areas in secondary schools in Cross River State Nigeria (2008-2012)



## V. Discussion of Results

The analysis on the evaluation of the effect of workshop and laboratory accident indicates that the average number of accident occurred most in chemistry department university of Calabar over the researched years at 25 times, table1 .

Subsequently in the further analysis there is greater significant difference across various department at  $\alpha=0.05$ . the result indicates that (1.175, 4.25, 5.575, 0.324) were all significant at the various department physics, chemistry, biology and computer science, Maths statistics department. The descriptive analysis on the department in crutech also indicate that chemistry department was exposed more to the laboratory accident over all the years of study with the average number of 18 times, table2. The result indicate that those in the computer science, mathematics and statistics department has less laboratory accident due to not being exposed to heavy chemicals, radioactive hazard etc.

The analysis of laboratory/workshop accidents in 18 secondary schools indicates that Bekwara secondary school in Bekwara Local Government has the average laboratory accident of 21.0 (chemistry) due to the remote locating of the school and level of ignorance. The least of 10.2 (physics) occurred in Government secondary school at Biase Local Government Area of Cross River.

## VI. Conclusion

Hence, from the result, 40 workshop safety and precautionary steps are release to avoid or minimize accidents in the laboratory or workshop towards a healthy carrier.

### Safety Rules/Precaution

- [1]. You must know how to read and write and able to communicate to others.
- [2]. The rules must be carefully pasted or presented in a hand book available for all the workshop/laboratory users.
- [3]. You must read carefully and understand all the rules before using the workshop.
- [4]. Always listen carefully to the teachers and follow instructions.
- [5]. Do not run in the workshop.
- [6]. Know were the emergency stop buttons are positioned in the workshop.
- [7]. Always wear an apron or lap coat as it will protect your clothes and skin.
- [8]. Wear good strong shoes plus thick soles
- [9]. Bags should not be brought into a workshop as people can trip over them.
- [10]. When learning how to use a machine or an equipment, listen very carefully to all the instructions given by the teacher. Ask questions especially if not fully understand.
- [11]. Do not use a machine if you have not been shown how to operate it.
- [12]. Be sure that all machine's have effective and properly working guard that are always in place where machine's are operating.
- [13]. Replace guards immediately after any repair or repair in progress.
- [14]. Don't oil or grease any machine while it is running.
- [15]. Don't try to stop any machine with your hand or body.
- [16]. Keep the floor clean of metal clips or curls and waste pieces, put them in container provided for such things.
- [17]. Don't rest against the machine.
- [18]. Get first aid immediately for any injury.
- [19]. Be sure you have sufficient light to see clearly check with the supervisor if you don't enough.
- [20]. Always wear safety glasses, or face shields designed for the type of the work operating any machine.
- [21]. Don't wear rings, watches, bracelets or other jewellery that could get caught in moving machinery.
- [22]. Keep the flow free of oil, grease or any other liquid. Always clear up the workshop.
- [23]. The workshop should always by well arrange in a protective manner.
- [24]. Safety goggles are very important.
- [25]. Eating is not allow in the workshop.
- [26]. Making calls or receiving calls in not allow in the workshop.
- [27]. No smoking is allow in the workshop.
- [28]. Make sure you or your fellow worker is not drunk before using the workshop.
- [29]. Never work while tired or taking medication.
- [30]. Try not to rush the job.
- [31]. Avoid distractions never surprise someone who is working with tools.
- [32]. Wear a nose mask.
- [33]. Wear a head-net.
- [34]. Never let children play in the workshop.

- [35]. Turn off the power source before closing the workshop.
- [36]. Never work with unprotected cut or break in the skin, particularly on the heads or forearms.
- [37]. Never use any mouth operated equipment in any area where unsealed radioactive materials is used.
- [38]. Label all containers clearly indicating nuclide, compound, specific activity, total activity, date and name of user. Containers should be properly sealed.
- [39]. Understand the nature of the hazard and get practical training.
- [40]. Plan ahead to minimize time spent handling radioactivity.
- [41]. The workshop attendance or anybody in charge should make sure all this rules are 100 percent guided the users.

### **Reference**

- [1]. Data on radioactive isotopes [www.microbiol.unimlb.edu.au/staff/ehs/isotope/index.htm](http://www.microbiol.unimlb.edu.au/staff/ehs/isotope/index.htm).
- [2]. Environment Health and Safety management Guide (2007) santos, [www.slideshare.net](http://www.slideshare.net):Retrieved on 06/05/2013. 06:25pm
- [3]. Hazard symbol en.wikipedia.org/hazard-symbol retrieved on 09/05/2013. 06:30pm
- [4]. Radioactive contamination en.wikipedia.org/wiki radioactive contamination retrieved 08/05/2013 02:30pm.
- [5]. Radioactive hazard [www.google.com.ng](http://www.google.com.ng) retrieved on 09/05/2013. 05:30pm
- [6]. Safe and secure [www.microbiol.unimlb.edu.au/staff/ehs/isotope/10goldrules](http://www.microbiol.unimlb.edu.au/staff/ehs/isotope/10goldrules) retrieved on 09/05/2013. 02:00pm
- [7]. Safety Catch; Safety training and consulting: by Mr. anil Gopinath [www.safetycoursesindia.com](http://www.safetycoursesindia.com) Retrieved 06/05/2013 6:23pm.
- [8]. Welcome to Safety + preventing Banana skin situation <http://www.safetyoneplus.com> Retrieved 07/05/2013 10:30am.
- [9]. Workplace Safety Resource, [www.knowledgeatwork.com](http://www.knowledgeatwork.com) Retrieved 06/05/2013 06:30pm.