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RESEARCH ARTICLE

APPRAISAL OF STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME IN RADIOGRAPHY IN DEPARTMENT OF RADIOGRAPHY AND RADIOLOGICAL SCIENCES, FACULTY OF HEALTH SCIENCES AND TECHNOLOGY, NNAMDI AZIKIWE UNIVERSITY, NNEWI CAMPUS

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Abstract

Students Industrial Work Experience Scheme (SIWES) is a skill training program designed to prepare and expose students of university for the industrial work situation they are likely to meet after graduation. Many universities are implementing this training program as one of the compulsory requirements of most fields of study. The study is to access and appraise the Students Industrial Work Experience Scheme by Radiography students of Nnamdi Azikiwe University. Data were collected electronically through Google form in the form of spreadsheet. Data collected were analysed using Statistical Packages for Social Sciences (SPSS), version 22.0 (SPSS IBM Corp, Armonk, USA, 2012) and descriptive statistics were used to analysed percentages, mean and standard deviations. 177 subjects participated in the study. 93 (52.5%) female and 84 (47.5%) males. Majority of participants were in the age range of 20-23 years. Availability of good equipment greatly influenced their choice of centers to go for the SIWES training. The cost of transportation was the major challenges faced the students of 149 (84.2%). Greater majority 176 (99.4%) described their SIWES experience as highly educative. All respondents 177 (100%) unanimously support the continuation of SIWES as a compulsory part of radiography studies. Although suggested that the government should give adequate support for transportation. SIWES is an essential process in Practical training which provides students the facilities and means of bridging the gap between career expectations developed in the classroom and the reality of employment in the real world. The cost of transportation is the major challenge faced by the student and they suggested that the government should give adequate support to alleviate it.

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Introduction: -

Students Industrial Work Experience Scheme (SIWES) is a skill training program designed to prepare and expose students of university for the industrial work situation they are likely to meet after graduation [1]. The scheme affords students the opportunity of familiarity and exposing themselves to handling equipment and machinery. Many

universities are implementing training program as one of the compulsory requirements of most fields of study. Industrial Training Fund (ITF) established the students industrial work experience scheme (SIWES) in 1974. SIWES is a planned and supervised training intervention best on a stated and specific learning and career objectives geared towards developing the occupational competencies of the participants [2]. The Nigeria University Commission (NUC) designed SIWES as a skill training program, which forms part of the approved minimum academic standard in the various degree programs for all Nigeria Universities [3]. It is an effort to bridge the gap between theory and practical work in Medicine, engineering and technology, sciences, agriculture, management sciences and other professional educational programs in Nigerian tertiary institution. It teaches students about machines and equipment, professional methods and ways of safeguarding work areas and the workers in the industries and organization [4].

The programme (SIWES) is a planned, supervised training and intervention programme based on stated and specific learning and career objectives, leading to the development of occupational competencies of the participants [5]. It also exposes and prepares students in institutions of higher learning for the industrial work situations which they are to meet after graduation. The authors also mentioned that the scheme helps to familiarize students with work methods and expose them to the necessary experience to handle equipment and machinery that are not available in their institutions [6]. The authors go on to say that SIWES also bridges the existing gap between theory and practice and expose students to necessary skills for a smooth transition from the classroom to the world work.

SIWES provide students with an opportunity to interact with others that can assess their abilities and performance [7]. More recent studies continue to cite many benefits for students that complete industry experience, including the improvement of teamwork, problem-solving and other vital employability skills. The authors expressed further that such experience (SIWES) leads to greater employment for graduates. The authors concluded that SIWES having gained a better understanding of the skills required in the workplace and their ability to perform such skills. In another development, Ugumanyi and Ezema [8] noted that SIWES plays a significant role in human resources development in Nigeria.

Development after graduation and also to impact on the student's performance academically.

In Nigeria, the current form of cooperative education is known as the SIWES. Often, Student mistakenly and commonly refers to SIWES as IT, where Industrial Training is generic; SIWES is a specific form of cooperative education or industrial training operation in Nigeria. Industrial training brings a lot of advantages and benefits where these benefits are unable to obtain from a classroom learning as mentioned by [9] "you cannot create experience you must undergo it. This is the purpose universities want their students to learn the above-mentioned soft skills by undergoing it with experiencing it. Since in the Nnamdi Azikiwe University, radiography department introduced this principle of "undergoing IT". An empirical report on the effect or impact of IT (SIWES) on student's performance. Hence, this research study intends to fill that gap. A study on the impact of SIWES on Radiography students will immensely be useful to a lot of stakeholders such as; Various bodies involved in the management of the SIWES exercise i.e. Federal Government, ITF, NUC etc. One of the issues usually faced by majority of students. The career expectation gap can be reduced after the student goes through the industrial training program. Students will only know what the actual practice of real world is like after undergoing the industrial training. The research will enhance students' interest in SIWES, since it will enable them know that, partaking in IT/SIWES will enhance their academic performance. In that case, students are able to, analyze and imagine class works in the light of reality. The experiences that students get through exposure to the business world, such as experience in situation where judgments and estimation are required, cannot be learnt in classrooms or from textbooks. Students can also bring along their industrial training experience into the classroom learning, enhancing the understandability of a student, hence improving the student's performance academically.

The employers benefit from industrial training as students are sources of future employees, also the employer's benefit from these programs, as IT/SIWES can provide them with inexpensive help, new ideas and potential future employees [10 and 11]. This study will also benefit the institutions offering IT/SIWES programs as it will educate them of the determinants that enable SIWES to enhance students' performance. The Students Industrial Work Experience Scheme (SIWES) holds immense potential for fostering skill acquisition and contributing to the technological advancement of the nation [12]. However, the scheme has fallen short of achieving its desired objectives, primarily due to a multitude of factors. These factors encompass the methods employed by educational institutions in assigning students to work placements, as well as the organizational structures of the training

establishments where students gain practical experience and develop their skills. Unequal distribution of acquired skills among students is also evident, with certain modalities receiving more attention than others. Furthermore, some students have encountered unfavorable experiences during their SIWES participation, leading to a lackadaisical attitude towards their chosen profession upon program completion.

Therefore, the aim of the study is to access and appraise the Students Industrial Work Experience Scheme by Radiography students of Nnamdi Azikiwe University.

Materials and Methods:-

Study design

This is a cross-sectional prospective survey study carried out at Nnamdi Azikiwe University, Nnewi campus, Anambra State, Nigeria.

Population

This comprised 400level and 500level radiography students of Nnamdi Azikiwe University, whom have completed their 6 months SIWES programme. They are three hundred and eighteen (318) in population.

Sample Size estimation.

Total population = 318 students. Using Yaro Yameni formula for calculation of minimum sample size.

$$n = \frac{N}{1 + (N)(e^2)}$$

Where n = Sample size

N = Total population

e = 5% acceptable error limit (level of significance)

l = constant

$$n = \frac{318}{1 + (318)(0.05^2)}$$

$$n = \frac{318}{1 + (318)(0.0025)}$$

$$n = \frac{318}{1 + 0.795}$$

$$n = \frac{318}{1.795}$$

$$n = 177.15$$

$$n \sim 177$$

$$n = 177$$

Sampling technique

A simple purposive sampling technique was used where student demographics and perceptions about SIWES and other factors were represented.

Inclusion criteria

All consenting 400level and 500level radiography students of Nnamdi Azikiwe University, whom have completed their 6 months SIWES program.

Exclusion criteria

Radiography students whom have not undergone the 6 months SIWES program.

Instruments for data collection

Self-structured electronic questionnaire. The electronic questionnaire comprised of 4 sections and comprise of 29 questions. Section A comprises of 5 questions which determine the demographic characteristics of the correspondents. Section B comprises of 4 questions which highlighted Radiography students perception towards the SIWES program. Section C comprises 11 questions which included challenges faced by Radiography students during SIWES program. Section D is comprised of 10 questions which highlighted the impacts and suggest possible ways of improving the SIWES program.

Method of data collection

The responses of the questionnaire were electronically collected through Google form in the form of spreadsheet.

Method of data analysis

Data collected were analysed using Statistical Packages for Social Sciences (SPSS), version 22.0 (SPSS IBM Corp, Armonk, USA, 2012) and descriptive statistics were used to analyse percentages, mean and standard deviations.

Results:-

A total of one hundred and seventy-seven (177) questionnaires were sent out and all were returned therefore there was a 100% response rate.

Table 1:- Socio-demographic Characteristics of Respondents.

Variable	Categories	Frequency	Percentage (%)
Gender	Male	84	47.5
	Female	93	52.5
	Total	177	100.0
Age	20-23	89	50.3
	24-27	65	36.7
	28-31	14	7.9
	31 and above	9	5.1
	Total	177	100.0
Marital Status	Single	161	91.0
	Married	16	9.0
	Total	177	100.0
Current year of study	400 level	25	14.1
	500 level	152	85.9
	Total	177	100.0

Table 4.1 showed that there were more female respondents 93 (52.5%) than their male counterpart 84 (47.5%). Majority of participants were in the age range of 20-23 years while the least were aged 31 and above (5.1%). Most of the participants were single 161(91.0%) and majority are in 500 level 152 (85.9%).

Fig 1:- Pie chart showing gender distribution.

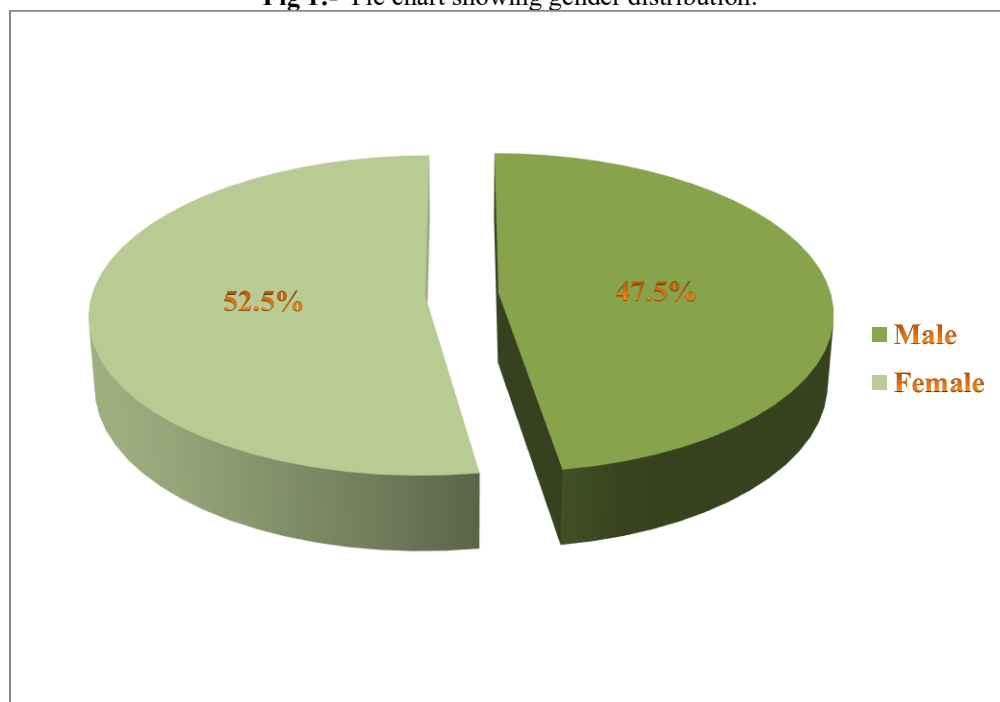


Fig 1 showed that the female respondents (52.5%) were more than the male respondents (47.5%).

Fig 2:- Bar chart showing age range distribution of respondents.

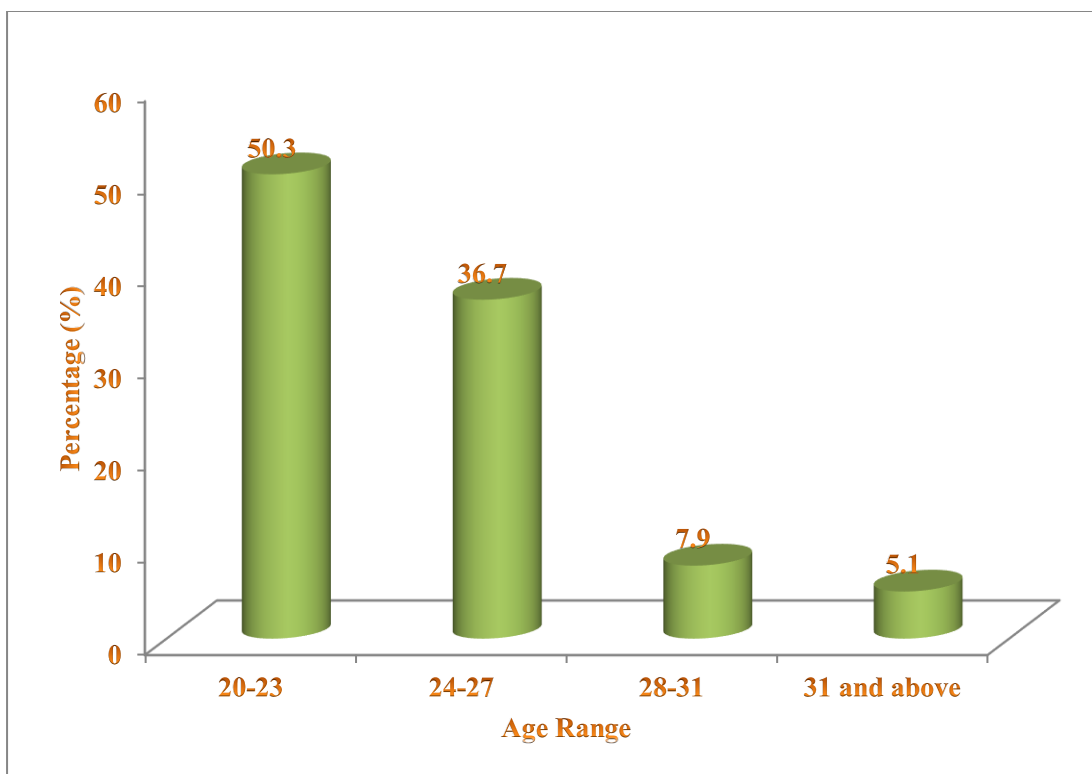


Fig 2 showed that half of the respondents were between the ages of 20-23 (50.3%) while the least age range were those above 31 (5.1%).

Table 2:- Distribution of responses on radiography student's perception towards SIWES program.

Variable	Response category	Frequency	Percentage (%)
1. SIWES positively influenced your technical skills and professional development.	SD	15	8.5
	D	2	1.1
	N	6	3.4
	A	74	41.8
	SA	80	45.2
	Total	177	100.0
2. SIWES prepares students for work after graduation.	SD	16	9.0
	D	2	1.1
	N	7	4.0
	A	79	44.6
	SA	73	41.2
	Total	177	100.0
3. SIWES exposes students to new work method	SD	14	7.9
	D	2	1.1
	N	5	2.8
	A	95	53.7
	SA	61	34.5
	Total	177	100.0
4. SIWES promotes employers involvement in education process and prepares students for employment.	SD	13	7.3
	D	1	.6
	N	14	7.9
	A	91	51.4
	SA	58	32.8
	Total	177	100.0

Table 2 showed that the majority of respondents 80 (45.2%) strongly agreed (SA) that SIWES positively influenced their technical skills and professional development. An additional 74(41.8%)agreed (A), while only 2 (1.1%) disagreed (D). A significant proportion 73 (41.2%) strongly agreed, and 79 (44.6%) agreed that SIWES prepares students for work after graduation. The majority of respondents 95(53.7%) agreed, and 61(34.5%) strongly agreed that SIWES exposes them to new work methods, a small percentage disagreed 2(1.1%). A significant percentage 91(51.4%) agreed, and 58 (32.8%) strongly agreed that SIWES promotes employer involvement and prepares students for employment. Only a small proportion disagreed 1(0.6%) to this.

Table 3:- Distribution of responses on characteristics of places of SIWES.

Variable	Response category	Frequency	Percentage	
			percent	Percent of cases
1. What were your criteria for picking a center?	Good equipment	121	31.4%	68.4%
	Practical exposure	108	28.1%	61.0%
	Close proximity	94	24.4%	53.1%
	Work incentives/payment	27	7.0%	15.3%
	Popularity of center	35	9.1%	19.8%
	Total	385	100.0%	217.5%
2. Which of these equipments were available in your center?	X-ray Machine	168	25.1%	94.9%
	Computed Tomography Machine	123	18.4%	69.5%
	Ultrasound Imaging Machine	155	23.1%	87.6%
	Magnetic Resonance Imaging Machine	77	11.5%	43.5%
	Mammography Machine	121	18.1%	68.4%
	Fluoroscopy Machine	26	3.9%	14.7%
	Total	670	100.0%	378.5%
3. Which equipment were you denied access to?	X-ray Machine	18	7.6%	11.3%
	Computed TomographyMachine	40	16.9%	25.2%
	Ultrasound ImagingMachine	67	28.3%	42.1%
	Magnetic ResonanceImagingMachine	46	19.4%	28.9%
	Mammography Machine	53	22.4%	33.3%
	Fluoroscopy Machine	13	5.5%	8.2%
	Total	237	100.0%	149.1%
4. Were all the available equipments in good working condition?	Yes	150	84.7	
	No	27	15.3	
	Total	177	100.0	
5. How was the Radiation protection in your center?	Poor	14	7.9	
	Fair	98	55.4	
	Good	65	36.7	
	Total	177	100.0	

Table 3 showed that the major criteria for picking a center were good equipment 121(68.4%), practical exposure108(61.0%) and close proximity. The least criterion was work incentives/payment 27 (15.3%). The major equipments that were available were the x-ray machine 168 (94.9%) and ultrasound 155 (87.6%) while the least available was the fluoroscopy machine. Majority agreed that all available equipment were in good working condition. The equipment with the most deniedaccess to the students was the ultrasound machine 67(42.1%), followed by the mammography machine 53(33.3%), the x-ray machine was the most accessible equipment with only 18(11.3%) students denied access to.

Table 4:- Challenges faced by radiography students during SIWES program.

Variable	Response category	Frequency	Percentage (%)	
			Percent	Percent of cases
1. Which of these challenges did you	Cost of transport	149	60.8	84.2

face?	Fear of radiation due to poor quality assurance test/maintenance	52	21.2	29.4
	Nagging from senior colleagues	44	18.0	24.9
	Total	245	100.0	138.4
2. Regarding the work hours, was it fair enough?	Yes	141	79.7	
	No	36	20.3	
	Total	177	100.0	
3. Did you find it difficult communicating with some patients as a result of language?	Yes	74	41.8	
	No	103	58.2	
	Total	177	100.0	
4. Did you ever feel inferior or disrespected as a student Radiographer?	Yes	53	29.9	
	No	124	70.1	
	Total	177	100.0	
5. How long did it take for you to get comfortable in the modalities?	2-3 Weeks	122	68.9	
	1-2 Months	41	23.2	
	3-4 Months	8	4.5	
	Not enough	6	3.4	
	Total	177	100.0	
6. List challenges faced apart from those already listed	Lack of incentives	108	61.0	
	Excess errands from senior colleagues	47	26.6	
	None	22	12.4	
	Total	177	100.0	

Table 4 depicts the challenges faced by radiography students of which majority 149 (84.2%) included cost of transport as a challenge while a few of them 44(24.9%) included nagging from senior colleagues as a challenge faced. A good number of them 141(79.7%) found the work hours fair enough for them. Over half of the respondents 103(58.2%) didn't find it difficult communicating with some patients as a result of language. Majority agreed 124 (70.1%) that they did not ever feel inferior or disrespected as a student radiographer. It took 2-3 weeks for most students 122(68.9%) to get comfortable with the modalities while a few 6(3.4%) agreed that the SIWES duration was not enough.

Table 5:- Impact of SIWES on radiography students.

Variables	Response category	Frequency	Percentage (%)
1. How will you describe your SIWES experience?	Educative	176	99.4
	Unnecessary	1	0.6
	Total	177	100.0
2. Does SIWES have a significant impact in your professional life in Radiography?	No	2	1.1
	Yes	175	98.9
	Total	177	100.0
3. Did SIWES increase your productivity and interest in radiography?	No	4	2.3
	Yes	173	97.7
	Total	177	100.0
4. How did SIWES affect your interaction with patients?	Positive impact	58	32.8
	Boosted confidence level	45	25.4
	Improved communication skills	48	27.1
	Increased patience and tolerance	21	11.9
	No impact	5	2.8
	Total	177	100.0
5. Which modality did you find the most interesting?	X-ray	30	16.9
	CT	37	20.9
	Ultrasound	60	33.9
	MRI	25	14.1
	Mammography	19	10.7
	Fluoroscopy	6	3.4

	Total	177	100.0
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Table 5 showed the impact of SIWES on the students where almost all respondents 176(99.4%) described their SIWES experience as educative. Majority agreed that SIWES had a significant impact in their professional life in radiography 175(98.9%) and increased their productivity and interest in radiography 173(97.7%). On how SIWES affected their interaction with patients, participants responded that it had a positive impact 58(32.8%), boosted their confidence level 45(25.4%), improved their communication skills 48(27.1%) and increased their tolerance 21(11.9%), however a few responded that it had no impact 5(2.8%). Ultrasound was the modality that many 60(33.9%) found most interesting while the least was fluoroscopy 6(3.4%).

Table 6:- Ways of improving the SIWES program.

Variable	Response category	Frequency	Percentage (%)
1. Should SIWES continue as a compulsory part of radiography studies?	Yes	177	100.0
2. The school should actively participate in the SIWES program through periodic visitation of various SIWES program centers.	Strongly disagree	15	8.5
	Disagree	1	.6
	Neutral	19	10.7
	Agree	80	45.2
	Strongly agree	62	35.0
	Total	177	100.0
3. Government should make funds/incentives available to the students to address the problem of transportation.	Strongly disagree	13	7.3
	Disagree	2	1.1
	Neutral	6	3.4
	Agree	49	27.7
	Strongly agree	107	60.5
	Total	177	100.0
4. The school should create a placement list of accredited centers to facilitate adequate learning.	Strongly disagree	14	7.9
	Disagree	5	2.8
	Neutral	6	3.4
	Agree	64	36.2
	Strongly agree	88	49.7
	Total	177	100.0
5. What are your suggestions for improvement?	Remuneration of incentives by the government	106	59.9
	SIWES duration should be extended	52	29.4
	Better organization of program	14	7.9
	No suggestion	5	2.8
	Total	177	100.0

Table 6 showed ways of improving the SIWES program. All respondents 177(100%) unanimously support the continuation of SIWES as a compulsory part of radiography studies. The majority agreed or strongly agreed 142(80.2% combined) to the school's active participation in SIWES through periodic visitation to program centers. A substantial majority (87.7% combined) agreed or strongly agreed, with 107(60.5%) strongly agreeing and 49(27.7%) agreeing to government support for transportation. A significant majority (86.0% combined) agreed or strongly agreed, with 88(49.7%) strongly agreeing and 64(36.2%) agreeing to creation of placement list of accredited centers. The most prominent suggestions for improvement include remuneration of incentives by the government 106(59.9%) and SIWES duration should be extended 52 (29.4%)

Discussions:-

Having a good communication with other radiographers is a factor that effects training, [13] discussed that psychological states of trainees especially motivation, self-efficacy, perceived control and the realities of the organizational context affects the training outcomes. From the study most of the students agree with this availability of facilities and equipment were the major reasons for the choice of SIWES placement of radiography student these facilities in the places of training enabled radiography trainees to have access to their use to facilitate practical skill acquisition and professional development. A lot of student seems to comprehend the working environment after

their training in agreement [to 14 and 15] Work experience through co-operative program provides credible means for softening the reality shock of transitioning from the world of academics to the working world. From the study majority of the respondents were female constituting to 53.5% of the population, the average age (20- 23) years of age. In the study above the total number of students that either strongly agree or agree with the positive influence of SIWES in their technical development and skills acquisition sums up to (n=154, 87.0%) of the total sample population. It shows that students generally strongly agreed, that SIWES prepare them for the work environment, and also makes transitioning into the working environment easier. Student sample population strongly disagrees on the involvement of employers in the educational process of the training program of the before the SIWES program (n=15, 9.6%). From the study above X-ray machine was the most abundant equipment available in most place of attachment of SIWES (n=168, 25.1%), Fluoroscopy being the least available equipment the sample population at (n=26, 3.9%). Ultrasound was the modality found interesting (n=60, 33.9%) Good equipment and number of equipment (n=150, 84.7%) present in the place of attachment seem to be the major reason that student would pick to do their training over factors like better payment (n=27, 7.0%), distance/proximity (n=94 24.4%), the rest do not mind the factors. The study showed that there are several factors which effects, to different extent, the experience and satisfaction of radiography student on SIWE, the factors influencing students experience and satisfaction include work, relationship with other radiographers, distance of their place of attachment to their home location, number of modalities available for use at that given time.

The most important factor identified from the analysis affecting radiography students on SIWES is the exposure to varieties of equipment (a factor that is associated with the place of attachment). Certain centers do not have a given modality or are lacking certain equipment or other factors like good relation and communication with other radiographers, does not come close to the number of experiences gotten from the variety of equipments. There is a high rating of SIWES participants experience as noted after completing their training in accordance with their strong expectation with future development; example more availability of more modalities [16]. In this view, for better experience and satisfaction in the training program and also for continue and sustainable development of the profession efforts should be targeted in solving the above listed factors.

Conclusion:-

The respondents in this study identified that SIWES is an essential process in Practical training which provides students the facilities and means of bridging the gap between career expectations developed in the classroom and the reality of employment in the real world. The results of this work indicate that the respondents' perception to SIWES was generally educative and essential for productivity in future practice. The results are indicative that satisfaction with centers chosen were not just about incentive but from access of equipment presented to the respondents. They opined that cost of transportation is the major challenge faced by the student and suggested that the government should give adequate support alleviate it. Finally, this study adds to previous research that suggested that undergraduate work experience in general and SIWES programme in particular, has a positive impact on a student's early career success.

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