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The Extent of School-Industry Collaboration for Achieving Technical Education Graduates' Industrial Usability in Cross River State

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Authors' contributions

This work was carried out in collaboration between both authors. Author EUA designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author OTI managed the analyses of the study and the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Aims: This study focused on determining the extent of school-industry collaboration for achieving technical education graduates' industrial usability in Cross River State.
Study Design: The study adopt a descriptive survey design.
Place and Duration of Study: Technical Education lecturers and industrialist in Cross River State, Nigeria, between February 2017 and November 2018.
Methodology: The population of the study comprises of 2250 respondents, of which 12 respondents are from the school (that is, 8 lecturers from the Cross River University of Technology Calabar and 4 lecturers from the Cross River State College of Education Akamkpa) and 2238 from industry. The sample size for the study comprised 506 respondents. This represents approximately

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22% of the total industries population and the entire population from schools. The instrument for data collection was a structured questionnaire titled "Extent of School-Industry Collaboration and industrial usability of Technical Education Graduates Questionnaire (ESICAIUTEGQ)". The Usability scale reads: Very High Extent (VHE) = 5 points, High Extent (HE)= 4 points, Moderate Extent (ME)= 3 points, Low Extent (LE)= 2 points and Very Low Extent (VLE)= 1 point. Cronbach Alpha statistics was used to ascertain the coefficient reliability of 0.86. The researcher administered the graduate usability questionnaire through direct delivery method to Technical Education lecturers and industrialists to be completed. After collection, the administered instrument will be scored in line with instrument scoring guide and analyzed using mean and standard deviation.

Results: The results of the study revealed that School-industry collaboration in curriculum development for achieving technical education graduates' usability by industries was rated to a moderate extent. More so, the study uncovered that School-industry collaboration in curriculum implementation for achieving technical education graduates' usability by industries was rated to a moderate extent. School-industry collaboration in facilities utilization for achieving technical education graduates' usability by industries was rated to a low extent. Also, the study further revealed that there is a significant difference in the mean response of technical education teachers and industrialist on the extent of school-industry collaboration in curriculum implementation.

Conclusion: Based on the analysis, the study reveals the dangers of the school and industry existing in isolation. As such, school and industries should collaborate in building the technical education of their dreams and desires. Also, the government however would see to it the federal ministry of science, technology and innovation and the ministry of education be given special consideration in budget allocation and existing policies on education be review as to embrace global standards and improve relevance.

Keywords: School; industry; collaboration; usability; technical education.

1. INTRODUCTION

"Education as stated in the National Policy on Education, [1] ought to bring about the acquisition of appropriate skills and the development of mental, physical and social abilities and competencies as equipment for an individual to live in and contribute to the development of the society". "Education also trains one for quick, resolute, critical and effective thinking, an instrument par excellence for effecting national development" [1]. Education, According, to Battle and Lewis [2] "play a vital role in the development of human capital and its linked with an individual well-being and opportunities for better living. Education ensures the acquisition of skills and knowledge that enable individual to increase their productivity and improve their quality of life". With such an education (as mentioned above), the whole essence of technical education is uncovered.

"Technical and Vocational Education is used as a comprehensive term referring to those aspects of educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life" [1]. "Technical vocational education (TVE), According to Osifeso et al. [3], is a type of education designed for preparing an individual learner to earn a living (to be self-reliant) or increase his/her earnings in an occupation where technical information and understanding of the law of science and modern application to modern design production, distribution and services are regarded as essential for positive change". An education expected to produce a competent workforce who can compete excellently in a rapidly changing technological environment [4]. Only countries with higher and better levels of knowledge and skills respond more effectively and promptly to challenges and opportunities of globalization. This knowledge can be acquired under a stratified schooling environment.

"A school functions as a learning organization which strives to improve performance and build capacity to manage change" [5]. The school provide student with learning environment with which they grow in knowledge and develop skills, which is the product of education accumulated over time through experiences. These skills are veritable tools for those who seek employment with private firms, for it is the only evidence for a claim of usefulness. It is also the engines of economic growth and social development of any

country; those with these skills are quickly absorbed into jobs [6]. The un-quenching craving for technical skills in Nigeria is obvious in the number of already accredited technical institutions in the country. NBTE, [7] published that Federal Government of Nigeria has a total of 20 polytechnics, 18 Monotechnics (Colleges of Agriculture), six Colleges of Health Technology, 23 Specialized Institutions, one Innovation Enterprise Institutions, one vocational education institute and 19 Technical Colleges. State Governments have 37 polytechnics, 13 Monotechnics (Colleges of Agriculture), six Colleges of Health Technology, two Specialized Institutions, one Innovation Enterprise Institutions, one vocational education institute and 152 Technical Colleges. While the private sector own 18 polytechnics, one college of education, two special institutes, 78 Innovation Enterprise Institutions, 10 vocational education institutes and three technical colleges. All these are modalities among others such as student industrial work scheme (SIWES) internships, apprenticeship programmes set in place by government at different levels to create an environment where technology education can strive. Yet the general public and the labour market are increasingly lamenting on student usability as the school is perceived to shear a higher percentage from this problem of unskilled workforce since they are the foundation in the building of the industrial workforce. For it is believed they have failed to attain the goals as stipulated by FRN [8] and this is evident in the alarming unemployment rate.

"Usability according to Nigel et al. [9] can be measured by examining how the user interacts with the product, with particular emphasis on either how easy the product is to be used (ease-of-use), or whether the product will be used in the real world (acceptability)". The usability of a graduates is a function of the particular graduate to perform task, "think and do" in the field of production, which is why employers expect graduates to demonstrate a range of broader skills and attributes that include team-work, communication, leadership, critical thinking, problem solving and managerial abilities which can be acquired through education [10] and usability in the context of this study is define as user's rating of necessary ingredients or requirement needed for a particular device, programme or person to be used. Student's usability in this context is defined as the rating of required skills possessed by Technical Education Graduates by a particular class of employers, needed to carry out specific tasks in specific environments.

Over time, researchers such as [11,12 & 4] have blamed the problem of unskilled workforce on the fact that TVE programmes do not focus on current and possible societal need, narrow course content, outdated content, dumped workshops, outdated and obsolete machines, poor funding and low social status of TVE programmes. These, according to Onochie, [8], have resulted in the mismatch between skills possessed by technical vocational education graduates and skills needed by industry and business world. He further stressed that the situation is enunciated by lack of appropriate technical and vocational skills possessed by TVE lecturers. This assertion is the view that TVE lecturers do not go for training in the industry and as a result, they are not apprised with new technological trends and innovations and by implication, lecturers cannot teach what they do not know or impact skills they do not possess. In a similar view, [13] posited that "a strong education and training system is crucial for the development of enterprise and entrepreneurial culture, as well as fundamental to opening up routes for all individuals to succeed in the labour market, thereby playing a full part in civil society. Employers need to be able to recruit the right talent for their businesses, so that they can harness employee potential efficiently. Hence the need to foster greater exposure of young people to the world of work and facilitate closer involvement between schools and employers, so that young people can be inspired, mentored and coached by employers". Accordingly, Ahmed, et al. [14] also asserted that "the interaction between institutions of higher learning and employers in industries and related business organizations represent a means of contributing to quality education training programmes. The challenge to business and industry to succeed in an increasingly competitive world market is contingent upon skilled personnel, who learn, grow and adapt to the changing markets and technologies. It also improves mutual understanding and exchange of ideas between the Education and business sectors that can help to produce professional work-ready graduates".

"While Nigerian industries are fast growing in terms of the improvement in science and technology, unprecedented demand for better graduates has been set up. However, industry often complains that the existing technological institution's curricula fall short to tackle the

practical problems in the industry and this according to Ayofe et al. [15] is because technological institutions lack proper curricula that are suitable for the industries". Recently, curriculum, just as other government policies, has received a great deal of attention. Akinlua, [16] believed that the theoretical based education (The colonial education) which was inherited by Nigeria cannot make needed impact on the life of Nigerians. Deborah and Barnett [17], in the same opinion advised that higher educational institutions will be in a position to make significant impact in producing highly skilled workforce if they are aware of this trend (that is, switching from theoretical to practical curriculum) and adjust curriculum and instruction accordingly. It is on this background that Higher Education Institutions (HEI), in the work of [18] recommended that "all HEIs engaged in engineering education need to undertake a review of existing courses to consider the extent to which the global dimension is adequately reflected on their content". "This assessment of curriculum to meet workforce needs is an idea that higher education cannot do alone which is why Jones and Harrington [19] suggested that collaboration is a vital step in producing economic change through curricular reform. They emphasized the importance of a proactive approach by higher education through the creation of strategic partnerships with employers in key sectors in order to develop programs to meet 21st century workforce needs".

Training is the transfer of knowledge from a master knowledge carrier to a trainee. The school is design for this purpose, to equip students with the right knowledge, preparing them for self-competence and industrial absorption. Joint Teaching and Training in technology education is a collaborative measure that is deemed fit to bring about the transfer of usable skills. Prosser in his theories noted that Effective vocational training can only be given where the training jobs are carried on in the same way with the same operations, the same tools and the same machines as in the occupation itself. He also posits that Vocational education will be effective in proportional as the instructor has had successful experience in the application of skills and knowledge to the operations and processes he undertakes to teach. The above therefore divulge the inevitability of industrial experts in the teaching and training of technology education, thereby inculcating the right knowledge and improve usability.

Partnership between schools and industries seems to gradually becoming a common thing in the industrial and academic society. This partnership has given birth to programmes such as Student Work Experience Scheme (SIWES) and internships. Scholarship schemes, such as MTN Foundation Scholarship, Agbami Medical and Engineering Scholarship, NNPC/Chevron Jv National University Scholarship Awards, NLNG Scholarship, Total E & P Scholarship, Exxon/Mobil Scholarship, SPDC (Shell) Scholarship, NAOC (Nigeria Agip Oil Company) Scholarship, SNEPCO Scholarship and so on, which is aimed at contributing positively to national standards of the education sector and also equipping students for maximum performance. However, it appears these efforts have not yielded expected results instead the quality of technology education is still in doubt. The issue of unemployment has therefore argued the effectiveness of school-industry collaboration in the training of technical education graduates for self-competence and industrially usable in Cross River State. The problem of this study therefore, is the apparent unemployment of technical education students in Cross River State in particular and Nigeria in general despite efforts by government and private establishments to assist in ensuring that technical graduates have skills needed by industries. Specifically, this study seeks to determine the:

1. Extent of school-Industry collaboration in curriculum development for achieving technical education graduates' industrial usability in Cross River State.
2. Extent of school-Industry collaboration in curriculum implementation for achieving technical education graduates' industrial usability in Cross River State.

1.1 Research Questions

The following research questions guided the study

1. To what extent is school-industry collaboration in curriculum development for achieving technical education graduates' industrial usability in Cross River State?
2. To what extent is school-industry collaboration in curriculum implementation for achieving technical education graduates' industrial usability in Cross River State?

2. RELATED EMPIRICAL STUDIES

Kurtuluş and Kadir [20] Conducted "a study on factors hindering university-industry collaboration: An analysis from the perspective of academicians in the context of entrepreneurial science paradigm, at Uludağ University in Turkey-Bursa. Eight statements guided the study. Descriptive survey was used for the study, with a sample size of 170 faculty members of Uludağ University. The instrument for data collection was a face-to-face questionnaire. Cronbach Alpha was calculated to determine the reliability of the instrument and yielded a value of 0.73. The findings reveals that the academic institutes perceived negative factors in the collaboration processes. The findings further revealed that both parties (school and industries) need to be in contact through collaboration with the aim of developing new data, methods and technology. This is to strengthen mutual relationship and add value".

Banbul and Sintayehu [21] Carried out "a research on University-Industry Collaboration in Curriculum Development: Analysis of Banking and Finance Graduates' Attributes from Educators and Industries Perspective. The purpose of the study was to examine the role of university-industry collaboration in producing banking and finance graduates with employability skills from instructors and industries viewpoint. Questionnaire was used for data collection instrument and its reliability estimate coefficient was α=0.81. Mean and t-test were used to analyze data. In conclusion, industry workers and instructors believe that banking and finance graduates have acquired demonstrable theoretical and practical knowledge, professional skills, and professional ethics. The findings of the study shows that integrating employability skills and competency required for successful on-the-job performance of graduates needs strong collaboration between university and employers (industries) throughout curriculum development process".

Azodo, [22] Carried out "a study on attitude influence on performance in technical skill involved in a specific trade chosen among all the formal technical trainees of Don Bosco Technical Institute (DBTI), Onitsha, Nigeria. A 24-item questionnaire was used as an instrument for data collection. Pearson correlation coefficient (r) of relationship between attitude and performance in technical skill involved in technical education gave an 'r' value of 0.366 which was a positive correlation. The findings of this study shows that majority of the students has positive attitudes towards technical skill involved in technical education. There are also positive relationships between students' attitude in technical skill acquisition and their performance. This was evident from the overall attitude and performance mean scores of 4.3333 and 69.8376 representing 86.67% and 69.84% respectively".

Umunadi [6] investigated on "the education graduate skill development as perceived by employers in institutions and industries in Delta State. Two research questions guided the study. The study adopted the cross-sectional survey method. The population was made up of 140 technical education graduates that responded to the questionnaire that was used as instrument for data collection. The findings of this study, among others shows that through on-the-job training, the technical education graduate can acquire developmental skills to enable them survive and adapt to the work environment in both industries and institutions as their place of work. The findings also revealed that the skills acquired by technical education graduates in different areas can be enhanced when the industrial organizations can provide the necessary human and material resources to the institutions to enable then forge ahead in their task of producing skilled scientists, technologists, engineers and technical education graduates to generate and sustain the country's industrial growth".

Umunadi, [23] carried out a study on "effective implementation of TVET - industry partnership for employability of graduates through work integrated learning in Nigerian Universities. The study was centered on the implementation of work integrated learning by Nigerian universities in partnership with industries. Descriptive survey method was adopted for the study and 45-item structured questionnaire was used to collect data from 117 TVET lecturers in universities that offer TVET courses in South-Eastern Nigeria. The study was guided by three research questions with a coefficient reliability of 0.83. Data collected were analyzed using mean and standard deviation. The results of the study showed that work integrated learning is implemented to low extent by the universities, and the implementation is constrained by many factors such as poor teacher quality, lack of policy and curriculum provisions for work integrated learning experiences and activities. Many strategies that can enhance the implementation of TVET-based

work integrated learning by Nigeria universities were also identified. Based on the findings, it was recommended that government, TVET institutions and other stakeholders should give more support and encouragement for effective implementation of work integrated learning by universities in Nigeria in partnership with industries".

3. MATERIALS AND METHODS

The research design that adopted for this study is the descriptive research design (quantitative). This design is therefore a method of obtaining information from various groups or persons mainly through questionnaire or personal interviews in order to provide a relative complete understanding of what is happening at a given period of time [24]. The study was carried out in Cross River State with a population size of 2250 respondents, of which 12 respondents are from the school (that is, 8 lecturers from the Cross River University of Technology Calabar and 4 lecturers from the Cross River State College of Education Akamkpa) and 2238 from industry. A Multistage sampling procedure was employed in selecting the sample size of the industries as follows: firstly, simple random sampling technique will be used to select 15 industries from the three different trades. Secondly, a purposive or judgmental sampling will further be employed to select 11 industrialists from the 15 industries chosen from each of the three trades, making it a total of 495 respondents from the industries. The purposive or judgmental sampling can be applied where a researcher is aware of some respondents who can provide the best information for the achievement of the objectives of his study. Finally, 12 respondents will be drawn from the school. Hence this sums up to 507 respondents. A structured questionnaire titled "Extent of School-Industry Collaboration and industrial usability of Technical Education Graduates Questionnaire (ESICAIUTEGQ)" was used as an instrument for data collection. The instrument is structured into sections, A and B. Section A contains items on respondents' identity, i.e technical education lecturers or industrialist. Section B contains 20 items in two clusters of B1 and B2. Section B1-extent of school-industry collaboration in curriculum formation, it contains 10 items; B2-extent of school-industry collaboration in curriculum implementation, it contains 10 items. Furthermore, the instrument is structured on a five point response option of Very high extent (VHE)= 5 point, High extent (VE)= 4 points, Moderate extent (ME)= 3 points, Low extent (LE)= 2 points and Very low extent (VLE)= 1 point. The reliability of the instrument was analyzed with the Cronbach Alpha statistics and yielded a coefficient of 0.70. The administration of the instrument was done through direct delivery approach. By this method, copies of the questionnaire were distributed personally to the respondents by the researcher with the help of three research assistants that were briefed on the purpose of the research, contents of the questionnaire and how it should be administered. Also they were briefed on how to ensure appropriate retrieval of copies of the questionnaire from respondents.

4. RESULTS AND DISCUSSION

4.1 Research Question 1

To what extent is school-industry collaboration in curriculum development achieving technical education graduates' industrial usability Cross River State?

Table 1 shows that the respondents rated item 8 to a high extent, item 3 to a high extent, items 6, 7 and 9 to a moderate extent, item 1 and 4 to a low extent and 2, 5 and 10 to a very low extent. The grand mean of 2.65 shows that the respondents rated school-industry collaboration in curriculum development to a moderate extent. The standard deviation scores varied from 0.61-0.89, this shows homogeneity in the respondents rating.

The finding of this study shows that both the school and industry rated school-industry collaboration in curriculum development to a low extent. This therefore implies that there is a low synergy between the school and industry in the development of technical curriculum content which is the gateway to achieving a functional or usable technology education, thereby affirming the findings of (6) who revealed that technological institutions lack proper curricula that are suitable for the industries. This finding is in terms with [20] who stated that the academic institutes perceived negative factors in the collaboration processes. They further revealed that both parties (school and industries) need to be in contact through collaboration with the aim of developing new data, methods and technology. This is to strengthen mutual relationship and add value. Similarly, the study also revealed that the school and industry do not often formulate, review and evaluate the curriculum content together.

4.2 Research Question 2

To what extent is school-industry collaboration in curriculum implementation achieving technical education graduates' industrial usability in Cross River State?

Table 2 shows that the respondents rated item 16 to a very high extent, item 14 and 19 to a high extent, items 13, 17, 18 and 20 to a moderate extent, item 12 and 15 to a low extent. The grand mean of 3.04 reveals that the extent of school-industry collaboration in curriculum implementation is rated to a moderate extent. The standard deviation reported ranged from 0.58-0.86, this shows heterogeneity in the respondents rating.

Table 1. Mean and standard deviation on the extent of school-industry collaboration in curriculum development

S/N	Items on extent of school-industry collaboration in curriculum development	Mean	SD	Decision
1.	The school and industry jointly attends curriculum review conferences together	2.00	.78	Low extent
2.	Both the school and the industry are part of the members of curriculum formation bodies	1.49	.89	Very low extent
3.	The industry is permitted to champion some aspect of the curriculum, say, practical curriculum	4.21	.75	High extent
4.	The school consult the industry for content relevance before curriculum formation	2.22	.83	Low extent
5.	The industry is involve in curriculum evaluation	1.32	.70	Very low extent
6.	The industry often keep the school apprised of latest technological innovations	2.61	.61	Moderate extent
7.	Curriculum evaluation is done by both in the school and industry	3.41	.78	Moderate extent
8.	The school is not independence in decisions of what the working curriculum would be	4.61	.73	Very high extent
9.	The industry is involves in the evaluation of curriculum contents that are practically oriented	3.21	.70	Moderate extent
10.	The industry guides the formation of curriculum with facts concerning the rapid changes in technology	1.48	.79	Very low extent
	Grand mean	**2.65**		**Moderate extent**

Table 2. Mean and standard deviation on the extent of school-industry collaboration in curriculum implementation

S/N	Items on extent of School-Industry Collaboration in Curriculum Implementation	Mean	SD	Decision
11.	School allows the industry to teach some aspect of the curriculum	1.19	.67	Very low extent
12.	The industry sponsor students field trips	2.48	.77	Low extent
13.	The industry sponsors research programmes in the school	3.22	.66	Moderate extent
14.	The school and industry jointly organize seminars for both the students, lecturers and the industrialist	4.01	.83	High extent
15.	The industry is involved in students projects supervision	2.06	.61	Low extent
16.	There are industrialists who are part-time lecturers	4.57	.58	Very high extent
17.	Students are easily accepted by the industry for SIWES programme	3.25	.76	Moderate extent
18.	Students takes practical courses in the school workshop and the in the industry	3.46	.81	Moderate extent
19.	The school with industry organize exhibition program for students to showcase what they can do	3.65	.86	High extent
20	The school often go for training in the industry	2.60	.86	Moderate extent
	Grand mean	**3.04**		**Moderate extent**

The finding related to this research question revealed that both the school and industry rated school-industry collaboration in curriculum implementation to a moderate extent. From the above finding, it is safe to say that both school and industry has to do more in the area of curriculum implementation and as a way out. Which is why Fannell, [25] asserted that exchange of personnel between public and private establishments will help in improving quality. It is on this view that Dill and Van Vught (2010) uncover that governments around the world have stimulated linkages between academia and industry for technical advancement and economic growth. This, the government do in motivating universities to become more entrepreneurial, engaging more actively with the productive sector for Hands-On experience, thereby improving the scientific knowledge and understanding of students, as well as providing opportunities for working scientifically and developing hands-on skills.

5. CONCLUSION

This study was carried out to determine the extent of School-industry collaboration for achieving technical education graduates' industrial usability in Cross River State. The study concluded that technical education teachers and industrialists rated:

1. Collaboration in curriculum to a moderate extent. This implies that there is a low synergy between the school and industry in the development of technical curriculum content which is the gateway to achieving a functional or usable technology education
2. Collaboration in curriculum implementation to a moderate extent. From the above finding, it is safe to say that both school and industry has to do more in the area of curriculum implementation and as a way out. Which is why it was asserted that exchange of personnel between public and private establishments will help in the improvement of quality.
3. Collaboration in facilities utilisation was rated to a low extent. The implication of this is that training and process of hands-on-experience would be ineffective and inefficient due to inadequate supply of instructional materials, large class sizes, inadequate training facilities and weak linkages with local industries for both technical instructors and trainees.

6. LIMITATION AND SUGGESTION FOR FURTHER STUDIES

The study was limited by time, delay in retrieving some of the questionnaires from respondents, other personal engagements that often distracted the researcher attention from the study. However, the following suggestions for further studies were made;

1. Technical education teacher's perception on availability of industry and it influence on school-industry collaboration in the delivery technical education content in south-south Nigeria
2. Lecturers' perception on factors affecting students enrolment in technical education programme in tertiary institutions in cross river state
3. Industrialist perception of the influence of technical education lecturers content mastery and delivery of practical based curriculum on the relevance of skills possessed by technical education students in cross river state.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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