

Impact Of Artificial Intelligence In Enhancing The Sustainability Of Technical Education In Nigeria

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Abstract –

Technologies play an important role in the society. It has come with mixed feelings as disruptive in many spheres though with its benefits in accelerating growth and development. While the education sector is evolving strategies and adapting models to enhance the acceptability of their graduates by employers, the surfacing of Artificial Intelligence has come with it another dilemma. The emerging reality cannot be downplayed. The school system must accept, and remodel its curriculum to ensure it meets the requirements of the labour market for the advantage of its graduates. Consequently, this study assesses the impact of artificial intelligence in promoting the sustainability of technical education in Nigeria. The over-reliance on the possession of hard skills alone cannot guarantee good quality jobs for the graduates. The quantitative research design that employs the descriptive study was used for the study. The sample for the study consisted of the entire population of 30 respondents. The instrument contains 20 items on the impact of artificial intelligence on technical education. The mean acceptance was set at 2.50 minimum for acceptability. The findings revealed that the adoption of artificial intelligence would positively influence the growth of technical education and the marketability of its graduates in the labour market. The study recommended the remodelling of the curriculum of technical education to suit the reality of artificial intelligence.

Keywords: Artificial Intelligence; Technical Education; Impact; Curriculum; Remodel

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I. INTRODUCTION

Artificial intelligence has been a buzzword that is impacting every industry in the world. With the rise of such advanced technology, there will be always a question regarding its impact on our social life, environment, and economy thus impacting all efforts exerted towards sustainable development. Artificial intelligence (AI) is any task performed by a program or a machine that, if a human carries out the same activity, he/she has to have intelligence to accomplish the task [1]. So how does such intelligence contribute to achieving the world's sustainable development goals? Sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). In September 2015, all 193 Member States of the United Nations adopted a plan for achieving a better future for all — a universal call to action for the next 15 years to end extreme poverty, fight inequality and injustice, and protect our planet. This plan is composed of 17 Sustainable Development Goals (SDGs) that demonstrate the alignment of a new universal Agenda [2].

The high unemployment and underemployment rates especially among youth, are a great threat affecting the sustainable economic development of countries and are influenced by investment in education, and quality of living [3]. Education and having a job are closely linked. Hwang et al., (2020) thought that SDG 4 (Quality Education) is most closely related to SDG 8 (Decent Jobs & Economic Growth) and SDG 5 (Gender Equality). Unlike SDG 4 (Quality Education), SDG 6 (Clean Water), SDG 7 (Clean Energy), SDG 11 (Sustainable cities), SDG 12 (Sustainable Consumption and Production), and SDG 13 (climate change) don't have much connection with education. That means education and jobs are closely connected to the goals of Sustainable Development.

Technology or machines are taking over jobs that people used to do. Artificial Intelligence (AI) is predicted to become smarter than humans. Jobs that require physical work or don't need special skills might be taken over by machines. Robots and machines are good at doing the same task over and over again, like making things in a factory. This can be done faster and without mistakes. Many jobs will be taken over by technology and robots, but new kinds of jobs will also be made because of AI and robots. Coming up with new ideas doesn't always mean people will lose their jobs and be replaced by others. Technology can be a complementary force in the workplace.

Technology has changed the education landscape in general [5], [6]. In particular, this research paper will be focusing on students as they are the future of the workforce and this issue of automation and job loss or

gain is ultimately a question for the future. The objective of this paper is to evaluate the impact of automation and the future job prospects it will encompass, thus finding out if students are taking the necessary actions to learn and adapt to the future of technology-incorporated jobs. This phenomenon has affected how students think and decide on their careers. Adaptability is the key to survival for students in this current generation. Instead of changing their career path due to fear of being replaced by automation, students, and institutions are adapting to the current change of technological advancement. Technology has affected knowledge such as medicine, education, Technical Education communication, and professional services in an obvious way however technology has also created new categories of jobs hence, increasing employment over time in a less obvious way.

With the continuous development of artificial intelligence technology, the knowledge structure and skills of technical education students are at risk of being replaced by artificial intelligence. First of all, with the development of the times, the substitutability of artificial intelligence technology is increasing, the labour cost is decreasing, and the research and application of robot technology are increasing. Under such circumstances, the labour value of technical education students is challenged and impacted to varying degrees. Secondly, the development of artificial intelligence technology makes the employment prospects of technical education students uncertain. Once artificial intelligence has mastered a certain work skill that technical education students are engaged in, and the labour cost is lower than that of technical education students, then technical education students will be replaced by artificial intelligence. Also, technical education students must continue to update their professional skills in the future to adapt to the continuous updating and development of artificial intelligence technology. Technical education students, should have strong employment psychological self-adjustment ability, higher psychological quality, improve their core skills, and strive to have a place in the professional field to meet the challenges of the future. Therefore, technical education students need to constantly learn and improve themselves to ensure that they are competitive in the competitive job market.

For technical education students, the opportunities brought by artificial intelligence to their job opportunities are far greater than the challenges. First of all, artificial intelligence will give technical education students more space for all-round development, allowing them to engage in more autonomous and interesting work, while reducing work pressure and increasing satisfaction and income levels. Secondly, technical education students who are good at innovation are less likely to be replaced by artificial intelligence, because artificial intelligence cannot replace creative tasks and innovative occupations. Finally, artificial intelligence will create more new jobs and opportunities. Driven by technological progress, the professional setting of universities will also focus on the national strategy, so university students will have a broader employment space. Therefore, technical education students would be the biggest beneficiaries of the employment compensation effect of technological progress.

The advancement and integration of artificial intelligence (AI) in cognitive areas has threatened human employment significantly [7], [8]. Starting slow, AI has been advancing rapidly these past few years, overcoming many obstacles, and has proved to be more capable and more intelligent than humans in some areas [1], [9]. Although organizations have reported higher efficiencies through AI, these AI disruptions come at a high cost, replacing humans [10]–[15]. The algorithms used in AI have already invaded the skilled professional sector with software programs replacing “loan officers, attorneys, and sports and Technical Education journalists [3], [8], [16]. Currently labeled as the “industry 4.0” or the fourth industrial revolution, the impacts of AI, robotics, and big data are tremendous and unequal to prior revolutions, bringing along with it new changes in the future world of work [17]. History shows that many significant innovations in the past have been associated with a transition period of temporary job loss, followed by recovery, then Technical Education transformation, and AI will likely follow the same route [17], [18].

There is not enough research on the use cases of AI in the domain of “Education for Employment” that would allow the design of suitable interventions to utilize such disruptive innovation to improve the “Education for Employment” existing frameworks. This necessitates the importance of this current study.

Meanwhile, there is ample evidence that automation does not lead to job substitution, but rather to a re-allocation of both jobs and tasks in which robots complement and augment human labour by performing routine or dangerous tasks. This, in turn, places a premium on higher-skilled labour in the sectors in which automation has substituted for labour but also may create new lower-skilled jobs in other sectors due to spillover effects. As economist James Bessen comments, ‘Although computer automation is not causing a net loss of jobs, it does imply a substantial displacement of jobs from some occupations to others [19], [20].

Researches were published on how to improve education curricula to enhance the employability of students; frameworks were designed to facilitate the work of teachers, mentors, career advisers, and faculty to guide students through their career exploration and preparation (Moradeke et al., 2017; Olojuolawe et al., 2019; Olojuolawe, Fadila and Abdul Latif, 2019, 2019; Rufus Olojuolawe and Amin, 2019; Olojuolawe and Adeoluwa, 2022). Papers were published on the impact of AI on education and its impact on employment. But it seems there is a gap in connecting the three fields of research; education for employment. Studies are needed to evaluate and assess how AI can fit into the current learning and employability to evaluate what innovation can bring to promote

better education for employment systems or solutions. Therefore, this study aims to assess the impact of Artificial Intelligence for enhancing the sustainability of technical education in Nigeria.

Purpose of the Study

This study examines the impact of artificial intelligence on the employability of technical students. The study specifically examines:

1. The impact of Artificial Intelligence on technical students' creativity and innovation skills for employability;
2. The impact of Artificial Intelligence on technical students' skill shift and training for employability;
3. The impact of Artificial Intelligence on technical students' creation skills for employability.

II. LITERATURE

Artificial Intelligence Impact on Technical Students

Artificial Intelligence (AI) could be like mathematics, used to solve problems in many areas of science and technology. Some people say that AI systems with video can watch students in class to see how they feel and pay attention. This information can be combined with data from social media and IoT to help teachers and students. However, people are worried about their privacy and freedom of speech. Daphne Keller, the director of the Stanford Center for Internet and Society. Students should not have to give up their data without any say in the matter.

Artificial Intelligence (AI) will make personalized electronic tutoring systems (ITS) that adapt to how each student learns. Using ITS, the curriculum can be set up based on how well students are doing, and they can get feedback right away. Additionally, John Baker, the creator of Brightspace Insights, said that teachers can use its tools to identify students who are at risk and help them improve before the end of a term. The current educational systems overwhelm teachers with administrative and mechanical tasks. A favorite benefit of using Artificial Intelligence (AI) is that educational institutions can streamline work processes such as grading essays or measuring student responses. Such workload can require valuable time from lecturers and teachers and they would rather spend this time in guidance with students or lesson planning [26].

However, Singh, (2023) posits that Artificial Intelligence (AI) may bring biases in education as there are currently a couple of teaching practices in higher education that will be replaced by Artificial Intelligence (AI) software using complex algorithms designed and developed by programmers who can transmit their own biases or agendas.

Artificial Intelligence impact on the employability of Technical Students

Machines and automation have been replacing humans at work gradually ever since the Industrial Revolution. It started in agriculture and handicrafts, then in mass manufacturing, and currently in many administrative tasks. But with the technology advancements, smart machines that are powered by artificial intelligence (AI) and robotics, could potentially replace a larger proportion of existing human jobs than before. It is observed that this replacement will on the other hand create new jobs as in the past, but the concern is the percentage of jobs created will be relatively less than the replaced ones [26]–[28]. Outsourcing companies that provide services such as call centers or manufacturing may suffer since large corporates with advanced economies and technology, who outsource services to emerging countries such as India or even Egypt due to cost, will be able to maximize their Artificial Intelligence (AI) 's capabilities hence they will no longer need to pay for outsourcing services as overhead costs will be reduced and accordingly they might stop outsourcing of services and build in-house AI tools or robots [20], [29], [30].

Many studies have looked at worries about jobs, and now most experts agree that Artificial Intelligence (AI) will bring big changes to the workplace [30], [31]. Artificial Intelligence is capable of creating millions of new jobs in a few years because of machines and algorithms [22], [31]–[36]. Technology and machines should not only do tasks but also make things better and cheaper. The study indicates that using technology should lead to fewer people being out of work and that people can do new things in their jobs. In the past when machines replaced people, it often led to more jobs and higher pay. The thinking now that AI will probably make people lose their jobs is misplaced as more jobs would be created. Artificial Intelligence (AI) programs may be used for tasks that are too costly or risky to hire humans for. In the future, AI will do more computer work, so people can focus on other things like helping others. Even, if machines take over some jobs, people will find new jobs like they did when automation took over farming and factory work, and people shifted to service jobs. The service sector companies are feeling good about using big data and are excited about using Artificial Intelligence (AI) and robots to help them work better. This will also help improve productivity, which is good for the economy [22], [32]–[36].

Learning and Employability Skills

Aside from the impact of Artificial Intelligence (AI) in creating new jobs, replacing jobs, or even shifting the job and labor market, two global employment crises already exist away from the implications of Artificial Intelligence (AI); high levels of youth unemployment and a shortage of talents who possess critical job skills. Gray, (2016) argued that if young people graduating from schools and universities, after exerting lots of effort, cannot secure decent jobs and observe that sense of respect that comes with such degrees, society may witness outbreaks of anger or even violence. There is an information gap in what works and what does not in preparing young people during their school-to-employment transition. After conducting an analysis of more than 100 education-to-employment initiatives from 25 countries, and surveying more than 8000 young people, employers, and educational providers in nine different countries (United Kingdom, United States, Morocco, Turkey, Mexico, Germany, India, Brazil, Saudi Arabia), [37] notes that employers, education providers, and youth have a different understanding of the learning and employability problems. The results show that the three parties live in parallel universes. In the below figure, it was shown how there is a clear disconnect and misperception about youth job readiness from the point of view of employers vs youth vs educational institutes.

One surprising finding is that each stakeholder's view was often so different from one another in a way that it's difficult to believe all those stakeholders are on the same page. On the other hand, it was found that a key attribute to the success of such a framework is the engagement and intensive interaction between education providers and employers. So for instance, employers may help in developing or guiding the educational curriculum and offer their employees and experts to provide lectures or workshops, while providers can develop learning simulations for the workspace environments. The framework proposed different layers of interventions under each pillar [3], [8], [16], [26], [29], [38]–[41].

III. METHODOLOGY

Design of the Study

The study is a quantitative research that adopts a descriptive survey because of the need to generalize the results [42]–[44]. Descriptive survey research is one in which a group of people is studied by collecting data through the use of a questionnaire or interview from a few people considered to be a representative sample of the entire group (Lawshe, 1975; Johanson and Brooks, 2010; Pellissier, 2010; Creswell and Creswell, 2013; Creswell et al., 2016). The design is considered to be suitable for the study since it intends to seek the opinions of government technical college students and teachers, and no variable will be manipulated.

The targeted population for this study will be all thirty (30) technical students in the University of Nigeria, Nsukka, Ikere Campus, and Bamidele Olumilua University of Education Science and Technology, Ikere Ekiti Ekiti State. The population comprised (25) Male and (5) Female. The entire population was used because of the size. The instrument that will be used for this study is the Impact of Artificial Intelligence on the Employability of Technical Students Questionnaire (IAIETSQ). The questionnaire consists of two parts; A & B. Part A solicits demographic data of the respondents which comprise Age and Sex while Part B comprises twenty (20) item statements and they are arranged in three clusters according to the research questions. Each cluster is weighted on a four-point rating scale of Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1. The instrument was subjected to face validation by two experts from the Department of Vocational and Technical Education, Faculty of Education, University of Nigeria, Nsukka, and Bamidele Olumilua University of Education, Science, and Technology, Ikere Ekiti. Based on their corrections and suggestions, the instrument was amended where necessary. Duplicated and ambiguous items were corrected before a final copy was approved for this study.

The reliability of the instrument was established by using the Cronbach alpha coefficient. Trial testing of the instrument was carried out in Ekiti State. The data from the administration of the questionnaire to the respondents was analyzed using the Statistical Package for Social Science (SPSS) 21 version. The reliability coefficient obtained was 0.75. This indicates that the instrument is stable. The researcher and two research assistants administered the instrument. A direct delivery technique was used. This approach was taken to minimize instrument mortality. The data collected were statistically analyzed using descriptive statistics of mean (\bar{x}) and standard deviation. A mean value of 2.50 and above was considered as 'agreed' while a mean rating of less than 2.50 was rejected.

IV. RESULTS AND FINDINGS

The figure below presents the demographic factors of the respondents as shown in Figure 1.

Gender of the Respondents

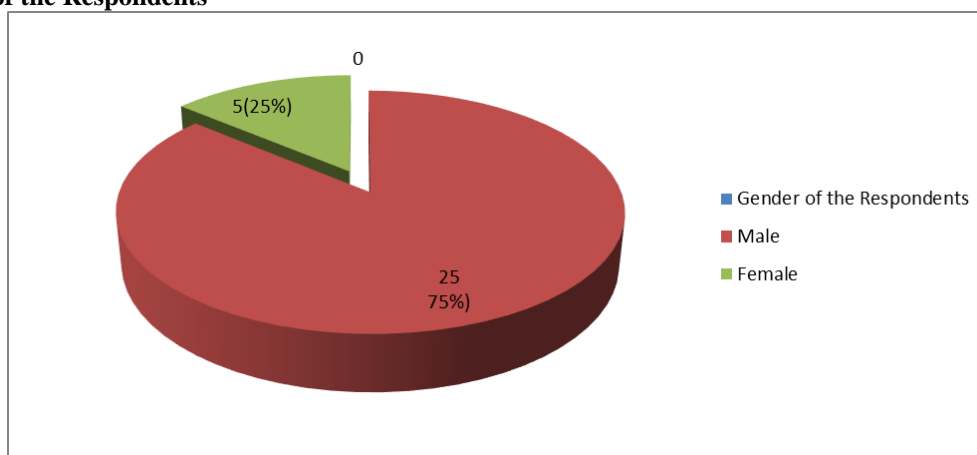


Figure 1: Gender Distribution of Respondents.

Figure 1 revealed that 75% of the respondents are male and 25% are female. This indicated that both genders were sampled for the study.

Analysis of Research Questions

Question 1: What is the impact of Artificial Intelligence on technical students with creativity and innovation skills for employability?

The analysis of the responses is presented in Table 1.

Table 1: Mean ratings of the impact of Artificial Intelligence on technical students’ creativity and innovation skills for employability

S/N	Item Statements	\bar{X}	SD	Remarks
1	Technical students who develop creative thoughts on the use of AI, easily find a new job	3.39	0.57	Agree
2	Technical students who can produce and explore the potential of the use of AI are employable	3.53	0.58	Agree
3	The ability of technical students to transform that enable the generation of previous ideas with the advent of AI enhances employment	3.49	0.57	Agree
4	Technical students’ ability to provide problem-solving-based pedagogies through AI enhances the chance of employment generation	3.57	0.50	Agree
5	Technical students who develop their innovative skills in the use of AI are easily employ	3.04	0.76	Agree
	Grand Mean	3.40	0.60	Agree

The result of the analysis presented in Table 1 revealed that the mean ratings of the responses of the respondents on five items relating to the impact of Artificial Intelligence on technical students’ creativity and innovation skill for employability had mean values that ranged between 3.04 to 3.57 which are greater than the cut-off point value of 2.50 on a 4-point rating scale. The above findings indicated that technical students who develop creative thoughts on the use of AI, easily find new jobs; technical students who can produce and explore potentials on the use of AI are quickly employed; the ability of technical students to transform enables the generation of previous idea with the advent of AI enhance employment; technical students ability to provide problem-solving-based pedagogies through AI enhance the chance of getting job and technical students who develop their innovative skills on the use of AI are easily employed. This means that the majority of the respondents agreed that there is an impact of Artificial Intelligence on technical students’ creativity and innovation skills for employability.

Research Question 2

The impact of Artificial Intelligence on technical students with skill shift and employability training is presented in Table 2.

Table 2: Mean ratings of the respondents on the impact of Artificial Intelligence on Technical students’ skill shift and training for employability

S/N	Item Statements	\bar{X}	SD	Remarks
1	The ability of technical students to convert already known skills to operate AI machines allows employment	3.54	0.60	Agreed

2	Technical students who attend training on the use of AI often have employment opportunity	3.43	0.75	Agreed
3	Technical students who can adapt to innovations in AI are gainfully employed	3.30	0.84	Agreed
4	Learning the new level of operating AI by technical students gives them a chance to get employment	3.38	0.78	Agreed
5	The ability of technical students to skill shift allows employment	3.49	0.64	Agreed
	Grand Mean	3.34	3.61	Agreed

The data presented in Table 2 above showed that the mean ratings of the responses of the respondents on all five items relating to the impact of Artificial Intelligence on technical students’ skill shift and training for employability had mean values ranging from 3.30 to 3.54 which are all greater than the cut-off point value of 2.50 on a 4-point rating scale. The finding revealed that all the respondents agreed that the ability of technical students to convert already known skills to operate AI machines gives them employment opportunities; technical students who attend training on the use of AI often have employment opportunities; technical students who can adapt to innovation on AI are gainfully employed; learning the new level of operating AI by technical students give a chance of getting employment and the ability of technical students to skill shift allow employment. The grand mean value is also greater than 2.5, which indicates that there is an impact of Artificial Intelligence on technical students’ skill shift and training for employability

The impact of Artificial Intelligence on technical students with programming language skills for employability is in Table 3.

Table 3: Mean ratings of the respondents on the impact of Artificial Intelligence on technical students with programming language skills for employability

S/N	Item Statements	\bar{X}	SD	Remarks
1	The ability of technical students to develop a programme language workable with AI machines enhances job opportunities	3.11	0.93	Agreed
2	Technical students who know database modeling have the opportunity to be employed	3.22	0.86	Agreed
3	Technical students possess who understanding of statistical analysis and can create algorithms that will operate AI machine	3.34	0.83	Agreed
4	Technical students with the ability to understand and interpret algorithm language will find job opportunities in a digital world	3.07	0.91	Agreed
5	Technical students who can develop problem-solving skills will find it easy to be employed	3.21	0.85	Agreed
	Grand Mean	3.19	0.88	Agreed

Data presented in Table 3 above revealed that the mean ratings of the respondents on all five (5) items relating to the impact of Artificial Intelligence on technical students with programming language skills for employability had mean values that ranged between 3.07 to 3.34 which are all greater than the cut-off point value of 2.50 on a 4-point rating scale. The above findings revealed that the majority of the respondents agreed that the ability of technical students to develop a programme language workable with AI machines enhances job opportunities; technical students who know database modeling have the opportunity to be employed; technical students who possess and understand statistical analysis and can create algorithms will operate AI machine; technical students with the ability to understand and interpret algorithm language will find a job opportunity in digital and technical students who can develop problem-solving skill will find it easy to be employed. The grand mean in the table is also greater than 2.5 which implies that there is an impact of Artificial Intelligence on technical students with programming language skills for employability.

V. DISCUSSION

The findings of research question one revealed that technical students who develop creative thoughts on the use of AI, easily find new jobs; technical students who can produce and explore potentials on the use of AI are quickly employed; the ability of technical students to transform that enable the generation of previous idea with the advent of AI enhance employment; technical students ability to provide problem-solving-based pedagogies through AI enhance the chance of getting job and technical students who develop their innovative skills on the use of AI are easily employ. This means that the majority of the respondents agreed that there is an impact of Artificial Intelligence on technical students’ creativity and innovation skills for employability. The test of hypotheses also revealed that there is a significant impact of Artificial Intelligence on technical students with creativity and innovation skills for employability. These findings are in line with the findings of researchers that the present-day digital world of automation needs students who are creative and innovative for effectiveness in job operations [1], [5], [9], [18], [41], [50], [51].

Training on the use of AI promotes propensity for employment opportunities. Technical students who can adapt to innovation in AI are gainfully employed; learning the new level of operating AI by technical students gives a chance of getting employment and the ability of technical students to skill shift allows employment. This indicated that there is an impact of Artificial Intelligence on technical students' skill shift and training for employability. The findings confirm that training is essential for youth who desire to find space for modern work where technology is highly put in place [1], [3], [51], [52], [4], [5], [8], [9], [18], [29], [41], [50].

The ability of technical students to develop a programme language workable with AI machines will enhance their job opportunities. Technical students who know database modeling have the opportunity to be employed; technical students who possess and understand statistical analysis and can create algorithms will operate AI machines; technical students with the ability to understand and interpret algorithm language will find job opportunities in digital and technical students who can develop problem-solving skill will find it easy to be employed. This implies that there is an impact of Artificial Intelligence on technical students with programming language skills for employability. This finding aligns with [6], [30], [31], [41], [53], [54] that a significant relationship exists between knowledge of programming language and the operation of automated machines for job performance.

VI. CONCLUSION AND RECOMMENDATIONS

The study reviewed the literature on artificial intelligence with the sole aim of understanding the gaps that have been filled. Realizing that not much has been achieved in matching graduates with employment, particularly in Africa and technical education, efforts were made to X-Ray the roles derivable in the adoption of AI in reducing the growing rate of youth unemployment. This will also translate to a reduction in the rate of criminality, internet fraud, and banditry which is now seen as the shortest means of economic breakthrough among the youths. Similarly, the study extended the body of knowledge in AI concerning technical education with practical emphases on its impacts.

The result showed that technical students with creativity and innovation skills; skill shifts and training and students programming language skills are needed in the operation of Artificial Intelligence and they enhance access to employment. Technical students will be more gainfully employed in the world of modern technology with the adoption of AI. There is a need for the students to acquire necessary skills such as creativity and innovation skills; skill shifts, training, and programming language skills. Hence, this study recommends curricula remodeling to encompass AI components for technical education, particularly in Nigeria. Future research should focus on the strategies for the introduction of AI in the curriculum of technical education and the aggregate skills index for its implementation.

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