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Leveraging on the Fourth-Industrial-Revolution on Digital Skills Acquisition among undergraduate students in Tai-Solarin University of Education, Ogun State, Nigeria

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Abstract

The study leveraging on the fourth- industrial-revolution on digital skills acquisition among undergraduate students in Tai-Solarin University of Education, Ogun State. Two research questions guided the study. A descriptive survey research design was used for the study. The population of this study comprised undergraduates of Educational Technology in Tai Solarin University of Education (TASUED). 95 undergraduates of the Department of Educational Technology were selected as sample size of the study using stratified sampling technique. A self-researcher-designed instrument tagged Fourth Industrial Revolution (4IR) and Undergraduates Digital Skills Acquisition Questionnaire (4FIRUDSAQ) was used for data collection with reliability coefficient 0.88. Descriptive statistics of mean and standard deviation were used for answering research question 1. Research question 2 was answered using PPMC. The findings of the study revealed that coding, data analytics, data literacy, digital marketing, online safety, problem solving, cloud computing, artificial intelligence, blockchain technology and collaboration digital skills were among digital skills needed by undergraduates to functions effectively in the labour market for the Fourth Industrial Revolution (4IR) ($3.10 > 2.50$). There was a positive relationship between Fourth Industrial Revolution (4IR) and digital skills acquisition among undergraduate students in Tai Solarin University of Education ($r = 0.468, p < .05$). The study recommended that undergraduates should be encouraged to be lifelong and life-wide learners to develop the capabilities needed in ever changing world.

Keywords: Artificial Intelligence, Digital Skills, Fourth Industrial Revolution (4IR), Undergraduates

Introduction

Undergraduates need strong digital skills to thrive in today's academic and professional landscapes. These skills are not just about using technology, but also about effectively navigating, evaluating, and creating in a digital world. Digital literacy empowers undergraduates with the ability to succeed in their studies, pursue diverse career paths, and contribute to a rapidly evolving digital society. Digital skills are crucial for finding, evaluating, and using information effectively for research papers, projects, and assignments. Apata et al. (2025) stated that digital tools facilitate access to online learning resources, interactive learning platforms, and collaborative projects, enhancing the learning experience. Undergraduates need to be proficient in using digital communication tools for academic discussions, group projects, and presentations, likewise, employers across all sectors increasingly require digital literacy skills, making these skills essential for graduates seeking employment. Digital skills enable undergraduate to adapt to new technologies and evolving work environments (Adeoye et al., 2022). It opens doors to diverse job opportunities, both within traditional industries and emerging digital fields and streamline workflows, improve productivity, and enable more efficient task management. Digital skills equip undergraduates with the skills to navigate the online world responsibly, including understanding online safety, ethical communication, and data



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privacy. Digital literacy skills also foster the ability to critically evaluate online information, identify misinformation, and participate in informed discussions. Digital skills empower undergraduates to not just consume digital content but also to create, share, and contribute to the digital landscape. In essence, digital skills are no longer optional; they are fundamental for undergraduates to succeed in their studies, prepare for their careers, and become responsible and engaged digital citizens. However, digital skills acquisition refers to the process of learning and developing the abilities needed to effectively use digital technologies, tools, and platforms (Adewale, 2022). This encompasses a wide range of competencies, from basic computer and internet navigation to more advanced skills like data analysis, coding, and cybersecurity. It's about becoming digitally literate, which includes understanding how to find, evaluate, use, manage, and create information in digital environments. This includes fundamental skills like using computers, navigating the internet, sending emails, and using common software like word processors and spreadsheets (Akinyemi et al. 2023). Digital skills are crucial in the Fourth Industrial Revolution (4IR) because they are essential for navigating and thriving in an increasingly automated and technology-driven world (Olubiyo, 2024). The 4IR, characterized by the convergence of physical, digital, and biological spheres, relies heavily on technologies like AI, robotics, and the Internet of Things. This necessitates a workforce equipped with the technical expertise to develop, implement, and manage these technologies, as well as the adaptability to learn and adapt to new skills as they emerge.

The Fourth Industrial Revolution (4IR), also known as Industry 4.0, is characterized by the fusion of technologies that blur the lines between the physical, digital, and biological spheres. This revolution builds upon the digital revolution and is marked by the integration of cyber-physical systems, the Internet of Things (IoT), cloud computing, and artificial intelligence (AI). Essentially, it's a new era of innovation that's transforming how we live, work, and interact with the world. The 4IR involves the convergence of various technologies like AI, IoT, robotics, 3D printing, biotechnology, and nanotechnology (Ndung'u & Signe, 2019). It also refers to the integration of physical processes with digital technologies, creating systems that can monitor, control, and interact with the physical world. 4IR relies heavily on data collection, analysis, and real-time insights to optimize processes and decision-making. 4IR technologies enable smart factories, smart cities, and the interconnectedness of devices and systems, leading to increased automation and efficiency. AI algorithms are used for automation, data analysis, and decision-making in various industries. IoT connects physical devices to the internet, allowing for data exchange and remote control. Robots are increasingly used in manufacturing, logistics, and other sectors to automate tasks and improve efficiency. Additive manufacturing allows for on-demand production, customization, and rapid prototyping.

Advancements in biotechnology are leading to new materials, personalized medicine, and other innovations. Manipulating matter at the atomic and molecular level has the potential to revolutionize various industries. 4IR technologies are expected to boost productivity, create new industries, and transform existing ones. 4IR is likely to impact the way we work, learn, and interact with each other, potentially leading to new social structures and challenges (Ndung'u & Signe, 2019). The development and deployment of 4IR technologies raise ethical questions about privacy, security, and the potential for job displacement. Individuals, businesses, and governments need to adapt to the rapid pace of technological change and develop new skills to thrive in the 4IR. In essence, the Fourth Industrial Revolution represents a significant shift in how we interact with technology and how technology shapes our world. It's a period of unprecedented innovation and transformation with the potential to bring about both great benefits and significant challenges. the Fourth Industrial



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Revolution (4IR) combines technological and human capacities in an unprecedented way through self-learning algorithms, self-driving cars, human-machine interconnection, and big-data analytics (David-West, 2021). The 4IR involves the integration of these technologies into various sectors, requiring individuals who can understand, build, and maintain them. As automation becomes more prevalent, digital skills become vital for roles that involve managing, monitoring, and optimizing automated processes, rather than solely performing repetitive tasks. The 4IR generates massive amounts of data. Digital skills in data science, analytics, and interpretation are crucial for extracting valuable insights and making informed decisions. The pace of technological advancements in the 4IR is rapid, meaning skills can quickly become outdated. Therefore, individuals need to be adaptable and embrace lifelong learning to stay relevant (Olubiyo, 2024).

The 4IR requires continuous upskilling and reskilling to acquire new digital competencies and stay ahead of the curve. Digital skills, encompassing the ability to use and understand digital technologies, is fundamental for participating effectively in the 4IR. While technical skills are essential, the 4IR also emphasizes the importance of soft skills like problem-solving, critical thinking, and creativity, which are less susceptible to automation. Working in teams, communicating effectively, and collaborating on projects, often remotely, are crucial in the 4IR. Navigating the complexities of the 4IR also requires emotional intelligence, including the ability to manage stress, adapt to change, and collaborate effectively. Understanding AI principles, developing AI models, and using machine learning algorithms are becoming increasingly important. In conclusion, the Fourth Industrial Revolution necessitates a workforce equipped with a diverse set of digital skills, coupled with the adaptability and lifelong learning mindset needed to thrive in a rapidly evolving technological landscape. In the shadowed corridors of modern learning, 4IR revolution is not merely a flickering technological trend; it's a haunting metamorphosis that beckons lecturers and undergraduates into a realm where the boundaries between digital and physical dissolve into an eerie, interconnected tapestry (Adeoye et al. 2022). At its core lie transformative technologies that seem to whisper promises of infinite potential yet carry an undercurrent of profound change. Among the most pivotal are the core technologies driving 4IR in education, each wielding a dark allure of innovation. Artificial intelligence, for example, transforms classrooms into personalised sanctuaries, where algorithms adapt lessons to individual learners' needs. The Internet of Things (IoT) creates a web of interconnected devices, linking undergraduates and lecturer across vast distances, an invisible network pulsing with life and knowledge.

Data analytics, often unseen but omnipresent, enables the crafting of customised learning journeys, revealing patterns that lie beneath the surface of traditional pedagogy. Artificial Intelligence (AI) as personal tutors guiding each student through their unique odyssey. Augmented Reality (AR) and Virtual Reality (VR), conjuring immersive worlds that make history, science, and art come alive in spectral detail. Big data analytics, which unearths hidden insights, allowing education to evolve with uncanny precision. As these technologies intertwine, they forge a new paradigm, one that challenges the ancient foundations of education, inviting us into a future where learning is no longer confined within the confines of a classroom but expands into an infinite, shadowy expanse of possibility (David-West, 2021).

Statement of the Problem

The Fourth Industrial Revolution is rapidly transforming economies worldwide. Many see it as a catalyst for national prosperity, economic growth, and widespread improvements in living standards, fueled by cutting-edge technologies. However, the Fourth Industrial Revolution (4IR), while offering



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numerous opportunities, also presents significant challenges. These include addressing ethical concerns related to technologies like Artificial Intelligence (AI), managing data privacy and security, ensuring equitable access to technology, and the need for widespread workforce reskilling. Furthermore, the 4IR can exacerbate existing inequalities, disrupt labor markets, and create new security risks. Individuals and organizations, equipped with digital literacy and skills, are undoubtedly key drivers of this revolution. They promote the adoption of new technologies, boosting productivity, job security, and employment opportunities. Beyond economics, digital skills empower undergraduates to participate effectively as digital citizens, navigating online platforms and tools to engage in society, politics, and government. Consequently, a nation with a critical mass of digitally literate citizens and workers is better positioned to reap the benefits of the digital economy and drive an equitable digital transformation. Countries are increasingly focusing on fostering digital literacy and skills development through policies and programmes. However, these efforts are often hampered by challenges like inadequate funding, unreliable electricity, limited internet access, high maintenance costs, a lack of qualified personnel, resistance to change, and even a deficit of self-control. Even, studies on the extent to which 4IR shapes digital skills acquisition among undergraduates in universities have received less attention in Nigeria, the few one was conducted outside the shore of the country. Hence, this look into leveraging on the fourth- industrial-revolution on digital skills acquisition among undergraduate students in Tai-Solarin University of Education, Ogun State

Objectives of the Study

The main objective of the study was to leveraging on the fourth- industrial-revolution on digital skills acquisition among undergraduate students in Tai-Solarin University of Education, Ogun State. Specifically, the study sought to examine the:

1. digital skills needed by undergraduates to functions effectively in the labour market in Fourth Industrial Revolution (41R) among undergraduate students in Tai Solarin University of Education;
2. relationship between Fourth Industrial Revolution (41R) and digital skills acquisition among undergraduates in Ogun State Tai Solarin University of Education

Research Questions

The following research questions were answered in this study:

1. What are the digital skills needed by undergraduates to functions effectively in the labour market in Fourth Industrial Revolution (41R) among undergraduate students in Tai Solarin University of Education?
2. Is there any relationship between Fourth Industrial Revolution (41R) and digital skills acquisition among undergraduates in Ogun State among undergraduate students in Tai Solarin University of Education?

Methodology

A descriptive survey research design was used for the study. The design is appropriate because it assisted the researcher to establish and collect needed data from the target audience towards answering research questions of the study. The population of this study comprised undergraduates of Department of Educational Technology in Tai Solarin University of Education (TASUED). 95 undergraduates of Department of Educational Technology in Tai Solarin University of Education (TASUED) were selected as sample size of the study using stratified sampling technique. A self-researcher-designed instrument tagged Fourth Industrial Revolution (41R) and Undergraduates Digital Skills Acquisition Questionnaire (4FIRUDSAQ) was used for this study. 4FIRUDSAQ was used for the collection of data from respondents on digital skills needed by undergraduates to functions effectively in the labour



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market in Fourth Industrial Revolution (4IR); and issues or challenges facing Fourth Industrial Revolution (4IR) in shaping digital skills acquisition. The questionnaire requested responses on a four (4) – point scale format which is a modification of 5-point Likert scale. To ensure the face and content validity of the instrument (4FIRUDSAQ), copies of the instrument were given to an expert in the Department of Educational Technology, Tai Solarin University of Education (TASUED) for content corrections, after all the identified corrections have been affected, the final drafts were used to gather the required data for the study. Reliability test of the instrument (4FIRUDSAQ) was done using a test-retest method. In this case, copies of the instrument (4FIRUDSAQ) were administered twice on 20 undergraduates of Department of Educational Technology, University of Ilorin, that are not part of the sample size within a week interval. The collected data from the dual administration of the instruments were compared using Pearson Product Moment Correlation (PPMC). It was reported that reliability coefficient yielded 0.88. Primary method of data collection was adopted in this study. Primary method includes the usage of questionnaire to collect data from the identified respondents. Descriptive statistics of mean and standard deviation were used for answering research question 1. Research question 2 was answered using Pearson Product Moment Correlation (PPMC).

Presentation Results

Research Question 1: What are the digital skills needed by undergraduates to functions effectively in the labour market in Fourth Industrial Revolution (4IR) among undergraduate students in Tai Solarin University of Education?

Table 1: Descriptive statistics on the digital skills needed by undergraduates to functions effectively in the labour market in Fourth Industrial Revolution (4IR) among undergraduate students in Tai Solarin University of Education

Items	Mean	SD
Coding skills	3.18	.999
Data analytics skills	3.11	.905
Data literacy skills	3.04	.957
Digital marketing skills	2.94	.884
Online safety skills	3.28	.923
Problem solving skills	3.33	.894
Cloud computing skills	3.24	.985
Artificial Intelligence skills	2.67	1.232
Blockchain technology skills	2.95	1.044
Collaboration digital skills	3.21	.947
Cluster Mean	3.10	

Source: Field Survey, 2025

Fig 1: Bar-chart showing digital skills needed by undergraduates to functions effectively in the labour market in Fourth Industrial Revolution (4IR) among undergraduate students in Tai Solarin University of Education



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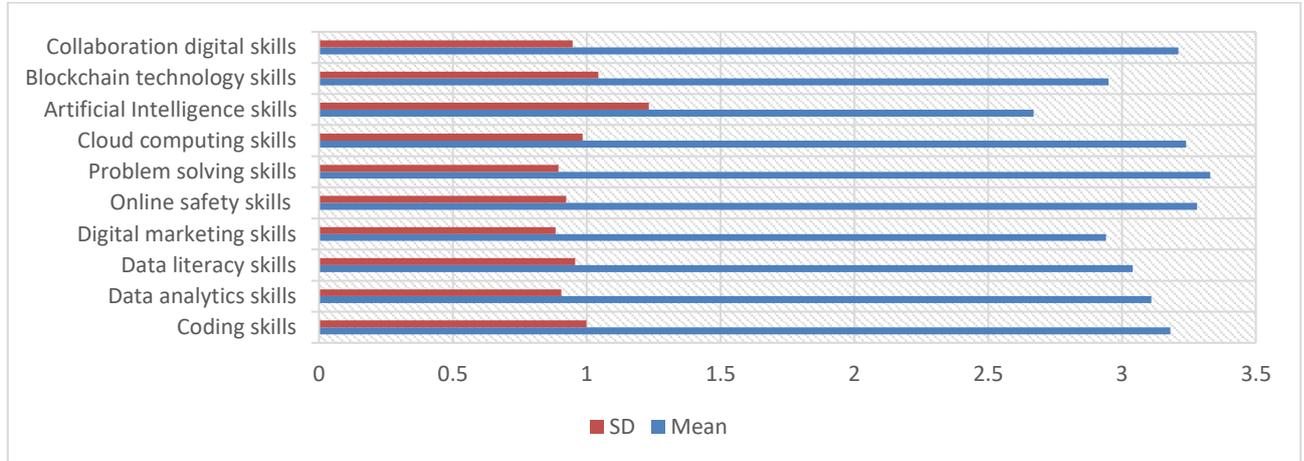


Table 1 revealed that cluster mean was reported as 3.10 and bench mark mean value was 2.50. The implications of this result were that $3.10 > 2.50$. This further that coding, data analytics, data literacy, digital marketing, online safety, problem solving, cloud computing, artificial intelligence, blockchain technology and collaboration digital skills were among digital skills needed by undergraduates to functions effectively in the labour market in Fourth Industrial Revolution (41R).

Research Question 2: Is there any relationship between Fourth Industrial Revolution (41R) and digital skills acquisition among undergraduates in Ogun State among undergraduate students in Tai Solarin University of Education?

Table 2: Relationship between Fourth Industrial Revolution (41R) and digital skills acquisition among undergraduates in Ogun State among undergraduate students in Tai Solarin University of Education

Variables	Mean	SD	df	r-value	p-value
Digital skills acquisition	39.87	12.04			
Fourth Industrial Revolution (41R)	28.99	9.392	93	.468	.001

Source: Field Survey, 2025

Table 2 depicted that there was significant relationship between the independent variable and the dependent variable in the order of ($r = 0.468, p < .05$). On this premise, the researcher concluded that there was a positive relationship between Fourth Industrial Revolution (41R) and digital skills acquisition among undergraduates in Ogun State.

Discussion of Findings

Research question 1 revealed that coding, data analytics, data literacy, digital marketing, online safety, problem solving, cloud computing, artificial intelligence, blockchain technology and collaboration digital skills were among digital skills needed by undergraduates to functions effectively in the labour market in Fourth Industrial Revolution (41R). These findings were in support to Apata et al. (2025) who found that students nowadays need AI skills, cloud computing skills, online safety skills as well as digital marketing skills for them to sustain their employment sustainability in the labour market. Sunday et al. (2024) found that integrating fourth industrial revolution technologies such as artificial intelligence and internet service into the academic programmes and research activities of the Akwa Ibom State University would enhance service delivery, thereby enhancing undergraduate’s digital skills development.

Finally, research question 2 showed that there was a positive relationship between Fourth Industrial Revolution (41R) and digital skills acquisition among undergraduates in Ogun State. These findings were in support to Abdullahi et al. (2022) found that despite the issues facing 4IR, it revealed a



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positive relationship with digital skills development. Alenezi (2024) revealed that insufficient support and training were identified as the primary obstacles to AI tool use in Blackboard among faculty members. Additionally, factors such as gender and educational level influenced the adoption of AI tools, highlighting various challenges in integration. Adio (2022) findings from the research revealed that utilization of 4th IR devices is low; level of awareness towards the utilization of 4th IR devices is low; Test of Hypothesis with Pearson Product Movement Correlation Coefficient (PPMC) revealed a significant positive relationship between awareness and utilization of Fourth Industrial Revolution devices at ($r=0.655$; $N=98$; $P<0.05$). Moreover, the findings showed that majority of the respondent preference to enhancement of productivity as the major benefit adopted for the utilization of 4th IR devices. Okebiorun (2020) study showed that; the Nigeria universities education is prepared for the fourth industrial revolution and further revealed that life-wide learning is suitable and flexible in empowering individual student to acquire all the knowledge and skills needed for the 4IR. The study concluded that lifelong and life-wide learning are the keys that give access to the 4IR.

Conclusion

This study leveraging on the fourth- industrial-revolution on digital skills acquisition among undergraduate students in Tai-Solarin University of Education, Ogun State; the following conclusions were drawn based on the findings of the study that coding, data analytics, data literacy, digital marketing, online safety, problem solving, cloud computing, artificial intelligence, blockchain technology and collaboration digital skills were among digital skills needed by undergraduates to functions effectively in the labour market in Fourth Industrial Revolution and that there was a positive relationship between Fourth Industrial Revolution (4IR) and digital skills acquisition among undergraduates in Ogun State.

Recommendations

The following recommendations were raised in line with the findings of the study:

1. The management of public University should incorporate artificial intelligence (AI) and internet services technologies into its system to aid the development of digital skills in undergraduates.
2. Targeted training programs and enhanced institutional support, improved internet access and AI tool subscriptions to strengthen teaching and learning. The insights inform capacity-building strategies in specialized Nigerian universities.
3. It was recommended that lecturers should possess unique technological skills to teach effectively in line with revolution from the Fourth Industrial Revolution (4IR). The 4IR on higher education are not mere talk, but a reality that university must embrace to remain relevant in the rapidly changing technological environment.
4. The curriculum must be updated to incorporate emerging technologies, innovative teaching and learning, and assessment methods. Finally, university must provide their lecturers with the necessary skills to adapt to the 4IR.
5. Undergraduates should be encouraged to be lifelong and life-wide learners to develop the capabilities needed in ever changing world.

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