

University internship systems and preparation of young people for world of work in the 4th industrial revolution

University
internship
systems

Oluyemi Theophilus Adeosun

Department of Economics, University of Lagos, Lagos, Nigeria

Ayodele Ibrahim Shittu

Department of Economics, University of Lagos, Lagos, Nigeria and ARUA CoE for Unemployment and Skills Development, University of Lagos, Lagos, Nigeria, and

Temitope J. Owolabi

Department of Sociology, University of Lagos, Lagos, Nigeria

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Abstract

Purpose – As the 4th industrial revolution (4IR) unfolds, there is an increasing awareness that its implications for workforce transformation and shifts in workforce demand will profoundly impact the future of work. Specifically, the paper seeks to answer the following research questions: i) how does Students' Industrial Work Experience Scheme (SIWES) equip young people for the real world of work, especially in the era of the third industrial revolution?; ii) does SIWES support the exposure of young people to the world of digitalization?; and iii) what are the effects of the SIWES exposure on the employability of young people? This paper aims to evaluate the University Internship system and preparation of young people for the world of work in the 4th industrial revolution.

Design/methodology/approach – This paper used a mixed method to unravel the objectives of this study, that is, quantitative and qualitative methods. For the former, structured questionnaires were used to elicit a response from 249 young people drawn from tertiary institutions across Lagos State, Nigeria. The latter used an in-depth interview method conducted among 45 respondents (25 employers of labor and 20 lecturers).

Findings – The findings reveal that: SIWES contributes meaningfully to the advancement of knowledge and capacity building among young people; SIWES exposes young people to the world of digitalization, depending on the organization where the internship takes place; and SIWES pays little attention to financial rewards and more attention to the acquisition of skills that are relevant to the world of work. The practical and policy implications of the findings are critically discussed.

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Originality/value – This paper critically evaluates the SIWES policy amidst the growing threats of widening skills gap, greater inequality and broader polarization.

Keywords University internship systems, World of work, 4th industrial revolution, SIWES, Graduates

Paper type Research paper

Introduction

Job creation and employment generation is a key focus of the ninth sustainable development goal. Limited job creation opportunities and growing youth unemployment rates are amongst the grand challenges facing many developing countries in Africa, including Nigeria. Even in the current outgoing third industrial revolution, typical African youths are experiencing diminished prospects of finding decent work at labor market entry. Many Nigerian graduates have been branded not workplace-ready, i.e. graduates who lack the necessary skill and knowledge required to meet industrial practices (Ogbuanya, 2018; Lee, 2020). Hence, in addition to curriculum relevance, the university internship program is also worth giving attention to as it impacts the world of work readiness, especially the 4th industrial revolution (4IR) (Kang, 2017; Calamlam and Moksheim, 2020).

Internships or immersion programs are work-based educational experiences related to specific jobs, positions, occupations or professions. They are career-oriented curricular endeavors of practical application (Togara, 2013; Mhaka, 2020). The practical activity is essential to give students first-hand skill development and knowledge that cannot be gotten within the classroom's borders. They are immersed in the culture and day-to-day process. Internship works with on-the-job training and is a type of traineeship program. Traineeships are short-term periods of work practice in a firm, public body or non-profit organization, during which a person receives training and acquires experience in a specific field or career area before taking up regular employment [International Labour Office (ILO), 2017; Herbert *et al.*, 2020].

Training is important to human capital development and the overall industrial advancement; it is further important in the industrial revolution and growth of industries. Training had proven to be a very useful component of an effective, smart, competent and reliable employee. It allows for correctness and meticulous job role performance (Ogbuanya *et al.*, 2018; Surajit *et al.*, 2021). The lack of practical use of theories learned in the classroom by graduates was identified by employers of labor as the major cause of graduates' abysmal performance when employed. The establishment of the Students' Industrial Work Experience Scheme (SIWES) enabled students to connect the academic world with real industrial situations before graduating from various institutes of learning. The scheme was established to allow students to handle equipment, machinery, gathering experience and familiarize themselves with situations the school environment cannot afford them (Rita, 2017; Molino *et al.*, 2020).

The objectives of SIWES, according to the Industrial Training Fund in 2013, are to i) provide an avenue for students in higher institutions of learning to acquire industrial skills and experience in their course of study, ii) prepare the student for the industrial work situation they will meet after graduation, iii) expose students to work methods and techniques in handling equipment and machinery that may not be available in their institutions, iv) make the transition from school to the world of work easier and enhance student's contacts for job placement, v) provide students with an opportunity to apply the knowledge in a real work situation to their training thereby bridging the gap between theory and practice and vi) to enlist and strengthen employer's involvement in the entire education process and prepare a student for employment in industry and commerce. As good as the scheme is, it encounters some serious challenges, among which is rise/increase in

the number of participating department and students, placement challenges, inadequate funding, poor orientation and delay in payment of SIWES allowance, to mention a few (Oladimeji *et al.*, 2017; Cimini, 2020).

Several studies have examined the effect of internship on student performance, such as Ali and Smith (2015) and Surajit (2021), who found that internship positively impacted student performance. Bukaliya (2012) confirmed that students acquire necessary skills and knowledge during the period of internship. This has made many universities make SIWES a mandatory program in the school curriculum and a requirement for the award of degrees (Bass and Heeks, 2011; Sule *et al.*, 2020). However, little consideration has been given to the multifaceted dimension of the effect that the SIWES scheme had on the graduate in terms of their current employment status and how the scheme has actually contributed to their post-university experience and especially the relevance of the scheme to 4IR.

This paper critically evaluates the SIWES policy in readiness for the take-off of the 4IR. Specifically, we explore how SIWES equips students for the real world of work, especially in the 4IR. Does SIWES support the exposure of students to digitalization while on the field? What are the effects of the exposure on students' employability? The paper thus proceeds as follows: the third section will present the theoretical and literary discourse, the fourth section will present the research methodology of empirical analysis, while data and results will be analyzed in the fifth section, the final section will then conclude the paper.

Empirical review

Taking a look at the necessary changes that need to be made to promote business education and reduce unemployment through SIWES, Ikechukwu (2016) and Okolie *et al.* (2020) noted that vocational education is not encouraged in Nigeria, unlike countries like China and the USA that introduce vocational training to the students from the primary level, he noted that the objective of SIWES in reducing unemployment through the preparation of students for real-life work environment had not been achieved owing to the low consideration giving to vocational training. Using data from 320 respondents, they found that posting students to the industry of relevance and making sure those students get placement will go a long way in reducing unemployment and increase vocational education. The study concludes that SIWES be modified to achieve business education graduates' employability and self-employment objectives. The study recommended that government make policies that will guarantee students' right placement in the right industry.

Knouse *et al.* (2008) and Okolie *et al.* (2021) also identified the relationship between participation in an internship and subsequent job placement. The study surveyed students at graduation and then six months later to examine the variables under study. At graduation, the researchers compared those who had participated in internships against those who had not on variables such as grade point average (GPA), age and employment status. Six months post-graduation, the study also compared those two groups on job placement status. The results indicated that those who had participated in internships had a significantly higher GPA and were more apt to be employed upon graduation than students without internships.

In Oladimeji *et al.* (2017) and Edet (2020), where the SIWES in Rufus Giwa Polytechnic was considered with respect to the experience, prospects, challenges and improvement, they established the need to link theories learned in school and real-world work. The research aimed to evaluate the students' Industrial Work Experience Scheme in Rufus Giwa Polytechnic, Owo. The findings show that the more department and students join the scheme, the more challenges they face in placing students for the training. They identified three sources for placement which are i) institutional sourcing, ii) individual student sourcing and iii) employer request. Student sourcing for placement took a huge percentage

of sources for placement. Lack of student concentration, poor attendance of students, inadequate funding, too many students to a supervisor, increased number of students in the institution for SIWES program and inadequate industries willing to accept students for SIWES are some of the problems facing the scheme. In conclusion, the scheme has a positive impact on a student's early career success.

Shahroom and Hussin (2018) and Atiku and Boateng (2020) discussed industrial revolution 4.0 and education, they considered the role of the industrial revolution on education and how education activities are carried in the classroom. The 4IR has brought about artificial intelligence (AI), huge information and examination, distributed computing and portable arrangement, online networking, the Internet of Things, virtual reality and augmented reality; this has changed the face of education and instructional advances landscape into a new type of computerized teaching method and smart classroom. The paper concluded that for institutions to cope with the dynamics of the revolution, a proper strategy must be put in place. Furthermore, the revolution has aided educational advancement.

Ugwuanyi and Ezema (2010) as well as Oke and Fernandes (2020) considered the challenges of SIWES in the library and information science (LIS) in the information and communication technology (ICT) environment. The study also considered the effect of technological advancement in handling library information and processes. The study found that the advent of technology and ICT poses the serious issue of adaptation and training to efficiently carry out work processes with the new technology. The introduction of ICT to the LIS has made the SIWES scheme a more needed program. Among the recommendation provided by the paper was that LIS should revise their curricula and introduce new courses to meet the needs of employers in the public and private sectors. The study concluded that the SIWES program had played a major role in the development of human capital.

Case for and against Students' Industrial Work Experience Scheme in Nigeria

Clearly, employers of labor are dissatisfied with the output of Nigeria University in terms of workplace readiness of their graduates over the years. This prompted the establishment of SIWES. Among the internship intentions are to give students extra knowledge in the related areas of their studies; developing and enhancing the requisite skills for effective interpersonal and group work relations; personnel growth, maturity and independence (Mohd-Jaffri *et al.*, 2011; Alhammadi, 2021). Most importantly, the principal objective is to ensure that students are exposed to the real world of work and provide feedback to institutions on the significance or otherwise of the curriculum. Students, employers and universities are expected to benefit from the program.

Obviously, students amass a wealth of work experience from an internship (Okolie *et al.*, 2021; Binder *et al.*, 2015). Another angle is employers' benefits resulting from employing interns who are young fresh and of the first choice to work with (Kysor and Pierce, 2000; Mamaleka, 2020). The internship programs further create an enabling and harmony between the university system and the community (Weible, 2010; Tumuhe *et al.*, 2021). The interaction between the community and university generates feedback that can affect the university curriculum to tailor it toward industries' demands.

An argument has been raised against the SIWES program, one of them is the lack of proper supervision of the student by the institutions they belong to, and this has put the student at liberty to do according to their will. Another problem identified with SIWES is the abysmal job role given to a student at the internship place. Many are not given job roles related to their course of study and therefore do not gain the necessary skill to prepare for the world of work (Agboola and Ademiluyi, 2016; Mhaka, 2020). The pain of getting placement by a student is another problem facing the scheme. Other concerns include poor

funding, lack of accommodation, feeding and intern security as they leave their base to sometimes unknown territory poses a problem to the scheme.

Student Industrial Work Experience Scheme and the third industrial revolution (strength weakness opportunity threat analysis)

The third industrial revolution is the last of the great industrial revolutions and will lay the foundational infrastructure for an emerging collaborative age. Its completion will signal the end of a 200-year commercial saga characterized by industrious thinking, entrepreneurial markets and mass labor workforces and the beginning of a new era marked by collaborative behavior, social networks and professional and technical workforces (Jeremy, 2011; ILO, 2018). The third industrial revolution, powered by computers, robots and development in the automobile, medicine industries, brought so many pains and gains to the industries. In reality, many disciplines have already experienced a massive transformation with the advent of computers and the internet. The third industrial revolution economy allows millions of people to produce their own virtual information and energy. A new digital manufacturing revolution now opens up the possibility of following suit in durable goods production. In the new era, everyone can potentially be their own manufacturer and their own internet site and power company (ILO, 2018).

Many open source communities have sprung up making information of easy access, the use of the internet has replaced the traditional way of doing things, for example, the traditional newspaper, print media have witness massive reduction in production volume with blogs, social media taking over, this pose a threat to the industry (Newman, 2011; Ostapchuk, 2020). However, many firms have taken advantage of the opportunities presented by such platforms. Piracy is a major concern to the film-making industry, with YouTube offering almost free videos, which displace the traditional way of production.

Human capital usage decreases with the process of automation, which has seen many jobs automated, leaving human labor at the mercy of machines. With the dynamics in the industry, students need to undergo the SIWES program to be abreast with the latest development as many who are fit will have to compete with machines taking over the world of work.

Potential of Students' Industrial Work Experience Scheme and the world of work in the fourth industrial revolution

With the advent of the 4IR, several changes have been made in the world of work, the process of doing things, equipment used in doing things, among others. SIWES has the potential to educate and enlighten students about potentials and opportunities which the 4IR present among which is reduced barrier between innovator and the market, increase the use of AI which help to solve a diverse form of complex problems, SIWES also has the potential of introducing students to the use, management of robots which has made the world of work easier for labor. Furthermore, the integration of several technologies to carry out tasks can also be learned through SIWES. Clearly, summarizing the key components of the 4IR related to human resources and the need to prepare young people for the world of work during this period is important. Spagnoletto *et al.* (2019) explains these components in his work on shaping people's strategies in the 4IR where he said the forces shaping the future of work are new societal expectations, changing demographics, skills of the future, new business models, distributed workforces and task disruption as business priorities will be taken into cognizance during this period, hence, there is need to adequately prepare the young ones with the digital knowledge that 4IR demands and all human resource personnel also need to position themselves strategically.

In [Figure 1](#), we see the interplay of tertiary institutions, industry and government agencies and how they impact innovation driven by the participation of workplace-ready graduates, especially in the 4IR.

Theoretical review

This paper used the doing-using-interacting (DUI) model and the absorptive capacity theory to address university internship systems' issues and preparation of young people for the world of work in the 4IR.

Academicians in evolutionary economics argue that the DUI mode of learning is critical in the debate of learning in firms ([Jensen et al., 2007](#); [Lundvall, 2011](#); [Thomä, 2017](#); [Hessels et al., 2020](#)). They agree that the DUI mode of learning includes practice, interdisciplinary workgroups, integration of functions and close interaction with clients. It facilitates learning on the job by fostering informal transmission of tacit knowledge; enhancing the experience-based “know-how” and “know-who” among the learners; and increasing their competencies (i.e. whether specific or general) on the job. The DUI mode of learning is highly localized, deeply rooted in practical experience and regularly exposes learners to reflective conversations with significant others within their respective settings.

[Jensen et al. \(2007\)](#) opine that the DUI mode of learning is crucial to “successful” innovation in developing countries with high informal settings. Other types of learning include internal/external; passive/active; basic/intermediate/advance; organizational, channels (formal and informal), etc. Technological learning is the main concept of DUI, linking different types of technological learning and technological capabilities. For a better understanding and accumulation of experience and to be employable after graduating from various higher institutions, students must be able to “do,” “use” and “interact” with people, process, equipment and all that is needed to make them of great value to their employee, hence, the value of the SIWES scheme.

With respect to the absorptive capacity theory, the major objective of SIWES is to provide an environment where students can learn and practice what they have been taught in class. Technology and ways of doing things vary from time to time; therefore, the need to absorb new ways of doing things and put them into practice. According to [Cohen and Levinthal \(1990\)](#) and [Miroshnychenko et al. \(2020\)](#), absorptive capacity (AC) is the ability to recognize the value of new information, assimilate it and apply it to commercial ends. Preceding knowledge gives one

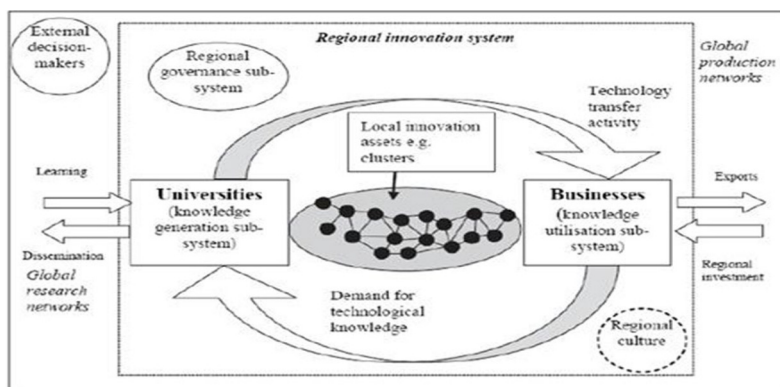


Figure 1.
Regional innovation system

Source: Cooke and Piccaluga (2004)

the ability to acquire new information. Firms with their own research and development are better able to use external information. There is little difference between learning capabilities (LC) and problem-solving skills (PSS). While LC is the development of the capacity to assimilate existing knowledge, PSS can create new knowledge.

The more effort is applied to learning, the better the subsequent retrieval, and so practice makes perfect. A diverse background provides a more robust basis for learning in uncertain situations and stimulates creativity by associating to more linkages. It depends on the transfers of knowledge across environmental boundaries and between subunits. Effective communication is required for the great absorption of information and knowledge. In such an environment, gatekeepers can help transfer information across boundaries, translate hard-to-understand information and serve as repositories of knowledge.

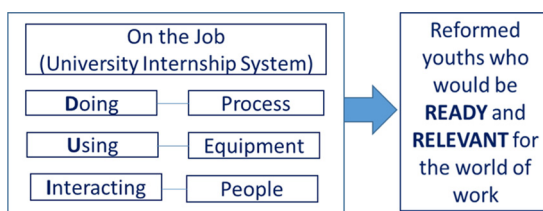
Cohen and Levinthal (1990) further add that diversity is key, and diverse knowledge structures in the same mind provoke learning and problem solving that yields innovation. Communications among diverse structures should lead to more novel linkages and associations. Firms may engage in basic research with high spillover because it gives them the skill to exploit innovations quickly. When a firm wishes to acquire and use knowledge unrelated to its ongoing activity, it cannot simply partner with other firms or by the technology; it should be prepared to invest internally in the AC to permit effective exploitation of such knowledge.

This study, therefore, adopts the DUI theory as expanded by the authors with the conceptual framework below. This is because the 4IR skills and development need hands-on training. Also, for the SIWES program to be successful, the student must be able to carry out a task (do), use various equipment and software available for day-to-day activities (use) and must be able to have a proper human relationship with other employees, partake in teamwork and so on (interaction). Figure 2 shows the conceptual framework on university internship system and preparation of young people for the world of work in the 4IR.

In the course of the internship system where the university curriculum is designed such that, young people are allowed to be involved in DOING the PROCESS, USING the EQUIPMENT and INTERACTING with PEOPLE, would result into reforming youths. This is because of the fact that the interface they would have with the work process, the tool and equipment as well as the people would inculcate the right skills, knowledge and competencies needed to achieve optimal result in the world of work which is largely driven by the forces of the 4IR.

Methodology

The study used a combination of qualitative and quantitative research methods. The study location was the University of Lagos. It is a federal institution with 77 departments spread across 12 faculties. Structured and open-ended questionnaires were used to elicit questions from 250 respondents (Students) who were randomly selected. This comprises students from engineering, environmental sciences, social sciences, science and arts to participate in the study.



Source: Authors (2021)

Figure 2.
Conceptual
framework on
university internship
system and
preparation of young
people for the world
of work in the fourth
industrial revolution

The qualitative method allowed for the use of in-depth interviews (IDIs), which elicited responses from 25 private sector professionals that were purposively selected. They are responsible for absorbing these students during SIWES programs, and as justified by [Boyce and Neale \(2006\)](#) as well as [Deterding and Waters \(2018\)](#), they are the key informants who have specialized information about the sub-sector. A total of 20 IDIs were also conducted among 20 academics (lecturers) which were also selected purposively because they serve as supervisors to these students, hence, appraising their performances after their SIWES programs. The interviews were conducted over a three-month period. Qualitative data analysis ([Mihás, 2019](#)) focused on thematic analysis based on the grounded theory approach looking at multiple qualitative accounts as used in the study.

Results and discussion of findings

Students' Industrial Work Experience Scheme – student perspective

Empirical analysis from the structured questionnaire administered randomly among graduates and students of engineering, environment, social science, science and art faculty showed that of the 249 students, 69.7% are male. In contrast, 30.3% represent the female category. This can be attributed to the heavy presence of a male in some of the selected faculties. Along with the faculty distribution, social science recorded 33.3% of the respondents while science and engineering followed closely with 26.7%, art and environmental faculty recorded 6.7% of the total population.

It was established that the majority of the respondents are exposed to the world of work for the first time. About 55.2% of the respondent just had their first SIWES experience. In comparison, only 44.8% had gotten the opportunity to engage in the scheme before, those who had the experience before confirm that they built on previous experience. The internship program's duration varies from three months to one year; however, 53.6% of the respondent spent at least six months on the internship role, while 21.4%, 25% spent a year and three months, respectively. It was also recorded that most of the respondents that are graduates are unemployed.

The ease of getting a placement and the role of the institution was considered; it was observed 76.6% of the respondent believe that the schools do not play any role in the placement of the students while just 23.4% claim the school was helpful in getting a placement. In this light, a respondent had this to say:

[...] it is often difficult to get a placement for SIWES because the school plays no part in this. Most employers reject our letters and before we get to see any placement, the time has elapsed to learn something (Male, 23 years, Engineering Department, University of Lagos).

We went further to consider how helpful the school is in getting placement into the various duration of the program using three months, six months and one year. However, most of the respondents did not have to take interviews when they finally got a placement as 65.5% of them did not take interviews as against 34.5% who had to go through the process of taking interviews.

One could argue for taking an interview as positive against not taking it, as it could offer one the atmosphere one will pass through during the period of job search; interviews will add to the process of being workplace-ready. However, no interview helps take the pain of looking for another placement in case of rejection owing to poor performance from an interview.

The choice of the SIWES organization is very important in the fulfillment of the mandate of the SIWES scheme; a poor organization will not be of good benefit to the intern, defeating the purpose of taking up such a role. Against this background, we are motivated to ask the

respondents to rank in order in priority in the choice of SIWES organization. Topping the rank is the need to gather experience (67%), followed closely by knowledge of the work (59%), future prospect (40%), money (35%) and proximity to one's home (18%).

The role performed and the significance to the course of study was accessed majority of the respondent performed averagely technical role (159), very technical role (47), minor technical role (34) and the menial and inconsequential role was performed by nine of the respondents. Furthermore, the overall SIWES program has a positive (82.1%) impact on the course of study. This agrees with the findings of [Knouse et al. \(2008\)](#). SIWES has also improved the respondent's knowledge in the area of theories and concept thought in the classroom. Many (79.3%) believe the scheme has adequately prepared them for the workplace. Many possess technical skills (53.6%) as against soft skills (46.4%).

Unfortunately, many (75.9%) of the respondents are not aware of the third industrial revolution. Those who are aware mentioned AI, data analysis, machine learning, energy, electricity and digitalization as a key breakthrough of the 4IR.

4IR skills picked from various place of the internship were considered in [Table 1](#), most respondents agree with most of the abilities picked up as being relevant to them. Many of the respondents are positive about digitization, data analysis, cognitive ability and others.

Among the 4IR skills in [Table 2](#), system skills seem to be popular and widely exhibited by the respondents; social skill is of great importance; hence majority picked it up, respondents agree to the importance of other skills which are of relevance to the 4IR .

Kindly indicate the extent to which you agree or disagree with the under listed skills picked up from your SIWES	Strongly agree (%)	Agree (%)	Uncertain (%)	Disagree (%)	Strongly disagree (%)
Robotics	3.85	19.23	50.00	15.38	11.54
Artificial intelligence	16.67	37.50	29.17	4.17	12.50
Digitization	17.86	64.29	7.14	10.71	–
Data analysis	34.48	44.83	6.90	13.79	–
Machine learning	30.77	34.62	19.23	7.69	7.69
Automation	20.00	40.00	28.00	12.00	–
Cognitive ability	29.63	59.26	11.11	–	–

Source: Authors computation (2020)

Table 1.
Fourth revolution
skills and the level of
learning by the
respondents

Kindly indicate the extent to which you agree or disagree with the under listed skills picked up from your SIWES	Strongly agree (%)	Agree (%)	Uncertain (%)	Disagree (%)	Strongly disagree (%)
Complex problem-solving skills	35.72	53.57	10.71	–	–
Content skills	34.62	50.00	11.54	3.85	–
Social skills	44.00	44.00	12.00	–	–
Resources management skills	40.74	55.56	–	–	3.70
Technical skills	46.13	50.00	3.85	–	–
Physical skills	46.43	42.86	10.71	–	–
System skills	55.56	40.74	3.70	–	–

Source: Authors computation (2020)

Table 2.
Fourth revolution
skills and the level of
learning by the
respondents

Respondent was asked who they best learned from, most of the respondent (56%) find it suitable to relate with the middle-level staff, while 20% of the respondent have access to top and lower-level managers, with a mirage of 4% finding it comfortable to relate with fellow interns. Overall, the scheme has positively impacted the respondents; ratings show that most respondents are satisfied with the quality of training received. 16% gave excellent remarks, 40% of the respondents agreed that the training was very good, further 40% gave a good remark while 4% gave a fair remark.

Students' Industrial Work Experience Scheme – lecturer's perspective

We randomly selected 20 lecturers spanning across grade lecturer II, Lecturer I, senior lecturers and professors at various faculties such as art, social sciences and engineering for the purpose of gaining further knowledge on the impact of university internship on interns. We asked them to rate the effect of SIWES on some under-listed student parameters, such as improvement in a student grade. It was discovered that student grades increase significantly after the internship as 70% of the lecturers agreed to the significance, 20% was uncertain. In comparison, 10% were of the opinion that SIWES did not improve student grades. In total 85% of the lecturers believed the quality of engagement in class after SIWES also improved, 5% was uncertain, while only 10% believed SIWES did not affect class participation. The impact of SIWES to enhance capacity to secure a job after school proved significant, as shared by 75% of the respondents. This further attests to the capacity of the SIWES program to boost the employability of the participating students.

Findings from the qualitative study corroborate this, and some respondents had these to say:

SIWES has been in existence for quite an age, even me, during my graduate and post graduate studies, I experienced it. I saw the practicality of what I was taught in the classroom, and it helped me a great deal (Female, Senior Lecturer, 55 years, University of Lagos).

The essence of SIWES is to blend theory and practice together. It has been efficient over the years because these students would learn and see with first-hand what they have been reading from books or taught in class (Male, Assistant Lecturer, 39 years, University of Lagos).

In the course of my supervision of SIWES activities in this university, I have noticed that these students come with a wide range of experience that even after leaving the four walls of the university, getting jobs have not been difficult, because they have acquired some experiences during the programme. [. . .]. Significantly, SIWES has always had great impact on learning (Male, Associate Professor, 62 years, University of Lagos).

The supervisors were asked the challenges facing the preparation of students for the 4IR and how can they be solved in [Table 3](#): Access to software, tools and poor lecturer exposure to the 4IR skills was highlighted; they believe that conferences, workshops on 4IR should be regular to keep lecturers abreast with trends. Also, a large student to lecturer ratio is a challenge. They believe increasing staff strength will be able to reduce the burden of lecturers. Furthermore, many firms are yet to key into the 4IR, so there is a need to transit from a crude way of doing things to a better one. The government can help in terms of providing funds to some of the firms to comply with 4IR. The lecturers believe that SIWES is poorly funded and inadequate basic learning facilities are a great threat. In solving the problem, they believe that industrial training fund (ITF) should do better in terms of funding SIWES. In contrast, Tertiary Education Trust Fund should do better in financing projects that will improve learning facilities.

In consistency with these were the qualitative findings that revealed the following:

Based on your field visit to your students during the SIWES programme please rate the following	Very insignificant (%)	Insignificant (%)	Uncertain (%)	Significant (%)	Very significant (%)
Digitization	–	15	35	30	20
Technical skill	–	–	–	65	35
Adaptability and agility	–	–	20	45	35
Problem solving	–	–	10	50	40
General soft skill	–	10	–	60	30
Automation	–	10	35	50	5
Machine learning	5	10	65	20	–
Coding	10	10	45	10	25
System thinking	–	10	40	20	30
Data analysis	–	5	25	30	40
Cognitive skills	20	10	25	30	15
Social media skills	–	–	–	60	40

Table 3.
Perspective of supervisors on significance of various skills picked during internship

Source: Authors computation (2020)

The SIWES scheme has its own specific goals and objectives, which mainly is to integrate learning and skill acquisition, however, it is posed with some challenges. Chief of which is limited access to tools and equipment to aid learning. [...] we are talking about the 4th industrial revolution, when these youths are not adequately exposed to technology, they would not be able to blend into the world of work (Female, Senior Lecturer, 58 years, University of Lagos).

Overall, the lecturers revealed that the university curriculum is yet to support the 4IR, and facilities in schools are not in compliance with the level of the 4IR. Students are better prepared for the world of work after the internship. Hence, they are encouraged to participate in boot camps by accelerator and innovation hubs to further develop skills necessary for 4IR. Placement location has contributed significantly to students' preparation for the world of work through teaching, understudying, on-the-job learning and other forms of teaching employed.

Students' Industrial Work Experience Scheme – employer's perspective

From our in-depth interview with 25 private sector professionals who absorb the students during SIWES, we found the choice of less tech-savvy firm over more tech-savvy firms or vice versa affects acquiring 4IR skills. This is basically the product of the work design of the firms students are deployed to. The level of skill applicable in the 4IR is no match to what used to be obtainable over the years, this is because of the advent of AI and other work activities aided by ICT. In view of this, a respondent had this to say:

[...] preparing young people for the world of work with the SIWES scheme demands the deploying them to organisations that are abreast with the demands of a technologically driven world. This is to adequately equip them and make them relevant after the completion of this program (Male, 45 years, Business Development Manager, Lagos).

This is in consistency with findings from [Cimini \(2020\)](#) who argued that some firms are up to date with the 4IR, while some are just upgrading while some are far behind. The firm a student is placed will significantly determine the level of exposure.

Furthermore, the study identified how school curriculum has gone obsolete; the firm does a lot of on-boarding for new interns to make them ready for the world of work. This shows

the misalignment between current realities and what the school system is inculcating into students (Oke and Fernandes, 2020). This was corroborated by a respondent:

The SIWES system has been effective because it would serve as a corrective measure for the deficiencies of our school system. When these students come for a compulsory SIWES, we find out that what they know does not match up with what is expected from them, hence, we have to train from the scratch them regardless of the cost we would incur (Female, 41 years, Head, Safety, Lagos).

Findings from Okolie *et al.* (2021) show how firms conduct tests for the students to determine who would get placement because of the need to bring on board, those that would be teachable. A study conducted by Atiku and Boateng (2020) find about 70% of students failing aptitude tests because of the school system has not been readily available to teach students what to expect in the labor market.

Conclusion and recommendations

This paper sought to explore the university internship system and preparation for the world of work in the 4IR. We obtained perspective from three core stakeholders, namely, the students, lecturers and employers, to get a better understanding of the subject. The findings reveal the following:

- SIWES contributes meaningfully to the advancement of knowledge and capacity building among young people;
- SIWES exposes young people to the world of digitalization, depending on the organization where the internship takes place; and
- SIWES pays little attention to financial rewards and more attention to the acquisition of skills that are relevant to the world of work.

The result from findings shows that the students' knowledge and capacity can be built on by allowing them to embark on SIWES or a program that will expose them to the world of work more than once. The technical role is prevalent among the respondent. This calls for the development of more soft skills.

Many respondents look for placement on their own without institutions playing any role in securing placement for the interns; this has led to poor supervision and monitoring of the students. Therefore, institutions need to do more in securing internship placement for the students. In the placement choice, interns look for where they can get knowledge, experience and job prospects ahead of the financial gains. Many of the respondents were exposed to 4IR skills and appreciated them more than the previous industrialization level. Furthermore, ITF does not pay the interns when due, and many got paid almost half a year after the program's conclusion.

It can be concluded that many lecturers are lacking the necessary 4IR skill and lack the necessary software, equipment to develop such skills. The university curriculum is also not supporting teaching 4IR related skills. It was also observed that the university is lacking in facilities. For internship supervision to be of a good quality, large student-to-lecturer ratio needs to be addressed.

The research has far-reaching policy and practical advice for the government, education sector and industry. Companies with the capacity to train in the fourth industrial exposure should be profiles and encourage to do more. At the same time, universities engage in curriculum review to incorporate 4IR skills and develop teaching techniques to encourage competency, creative thinking and problem-solving to impact their communities. Innovation hubs and multidisciplinary learning could complement SIWES to develop skills for the 4IR;

these hubs can give brief internship programmes to the lecturers. ITF allowance should be increased and organizations need not pay stipends so as to encourage them to absorb more interns. Furthermore, universities can leverage more on their alumni and companies they own or work with to widen the internship spaces.

Tertiary institutions should set up innovation hubs and science parks in collaboration with industry to provide opportunities for their students to do the internal internship. Other course and faculties not currently doing SIWES should be introduced to SIWES, and those doing it can be introduced to it earlier, i.e. 100 or 200 level. The ITF should also set up innovation labs themselves and equip it. They should partner with a technology-related company such as Facebook, Google, etc. Furthermore, innovation funds should be made available, homegrown technology should be adopted and a course on 4IR fundamentals should be introduced into the curriculum.

Theoretical implications

The results emphasize and extend the theory of DUI, which shows that as students have more hands-on experience via internship exposure, they are better able to add value to the world of work as they can integrate theory and practice. While other papers explored the DUI theory previously focused on firms and employees within the organization (Lundvall, 2011; Thomä, 2017), this research explores the context of students undergoing internship, which is a unique context. Students are encouraged to “do,” “use” and “interact” with people, processes, tools, systems and all that is needed to make them of great value to their future employers.

Recommendation for further studies

We recommend that further studies explore the perspective of the government agencies and representatives in SIWES management. Also, future studies can investigate the disparity in the quality of internship iWork place and its impact on student’s employability. While this work been a qualitative study that had leveraged more on descriptive analysis, more rigorous statistical analysis from a quantitative perspective should be used in future studies.

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Corresponding author

Oluyemi Theophilus Adeosun can be contacted at: oluyemiadeosun@gmail.com