# Exploring Undergraduate Students' Perception of 4IR Digital Era at a Higher Education Institution in South Africa

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**Abstract**

**Objective** –This study aims to explore undergraduate students' perceptions and knowledge of 4IR in relation to their accounting curriculum and careers at HEIs in KwaZulu-Natal. The digital revolution is altering the way in which people and organizations work, as well as nearly every other aspect of human life. Furthermore, 4IR is re-writing society's fundamental rules, which highlights the need for this paper.

**Methodology** –This study used a census approach to gather quantitative data from one of South Africa's HEIs, via an online questionnaire link created with the Microsoft Forms application. The study was conducted online with a total population of 257 exit-level students from the Diploma in Accounting programme, the population that was targeted. The sample size was 172 out of 257 students, with a response rate of 66.9%.

**Results** –The findings indicated that students' knowledge of 4IR is limited, with only 56.4% of students having an understanding of what big data, artificial intelligence and the Internet of Things (IoT) are.

**Research limitations/implications** –There is a need to close the knowledge gap between Financial Accounting students' knowledge of 4IR trends like big data, artificial intelligence (AI) and the Internet of Things (IoT) and curriculum content. The study's population was limited to exit-level students at one Higher Education Institution, hence the study's findings may not be generalizable to all HEIs.

**Novelty/Originality** –The study's novelty contributes to the growing body of research on how accounting technology can improve Financial Accounting education. The study provides an original perspective on the applicability of 4IR Accounting software systems and packages in a South African context, since most related studies were not conducted in South Africa. Furthermore, the study illustrates the importance of 4IR in the accounting curriculum.

**Keywords:** 4IR, Teaching and learning, Accounting education, Higher Education Institutions (HEIs), Accounting profession, course curriculum.

## 1. Introduction

The Fourth Industrial Revolution (4IR) is a trend that has sparked global political debates in both the economic and educational spheres (Mahlaba 2020). The "Fourth Industrial Revolution" is defined as a new era in which digitalization's influence is growing in unexpected ways. This is expected to have an effect on job security, particularly amongst graduates (Ghani and Muhammad 2019). This revolution is already infiltrating homes in both developed and developing countries, altering how young people receive, interact with and learn information.

As automation becomes more intelligent, responsive and interconnected, the list of jobs that will be automated grows (Teo *et al.* 2021). Humans now live in an unstable and unpredictable world, with dramatic global changes in all areas (Mahlaba 2020). Humans are currently attempting to accommodate 4IR, which can be defined as the vital interaction between humans and machines (Elayyan 2021). Therefore, it is critical to empower individuals to take charge of their education and career strategies (Reaves 2019).

The proliferation of cloud-hosted ICT infrastructure has resulted in an abundance of educational opportunities. Furthermore, a greater emphasis is placed on low-cost, mobile, adaptable and widespread technology solutions, developed and frequently provided by academics and students. Individual students and academics now have a significant degree of control over their learning and teaching. As automation becomes more sophisticated, modern skills are becoming increasingly important for young people entering the labor market. The Education sector is critical in preparing students for the uncertainty that surrounds 4IR (Teo *et al.* 2021). The fourth industrial revolution has shaken the educational world as a whole, raising concerns about the type of education that students should receive in order to be skilled in the 4IR era (Mahlaba 2020).

The research gap is students' awareness of 4IR, and the need to align the Financial Accounting curriculum to 4IR technology, which will give accounting graduates job market-expected technological skills in South Africa. Higher education in Africa risks falling behind if 4IR is not implemented (Fomunyam 2020). The effects of 4IR on education in general, and how teaching and learning processes are designed in particular, are unknown, as is the role of new technologies in defining skills demands, and ultimately influencing curricula development in educational systems (Teo *et al.* 2021). The main features of 4IR were formed by a variety of products and technologies. The Internet of Things (IoT) is an example of an internet-connected sensor embedded in products such as vehicles and home appliances that allows these things to connect, interact and exchange data (The Internet Society 2015). Elayyan (2021) stated that cloud Computing is another example of 4IR products, which refers to the use of a network to host massive volumes of data collected by IoT systems on the internet, rather than on personal computers. Further, explaining that Big Data analysis leads to better business decisions and drives innovation. Artificial Intelligence (AI) is another example of an IR 4.0 product, as it is comprised of computer science learning algorithms that enable machines such as robots to perform complex tasks like visual perception, speech recognition and decision-making.

The study shows an original contribution to the importance of incorporating 4IR topics into the Financial Accounting curriculum in a South African context. There is a need to close the knowledge gap as the findings of this study have indicated that accounting students do not have an in-depth knowledge of 4IR trends like big data, artificial intelligence (AI) and the Internet of Things (IoT). Furthermore, redundant and repetitive tasks that were the day-to-day tasks of accountants are now being replaced by artificial intelligence and automation, hence HEIs need to ensure that students are aware of 4IR trends. This is consistent with Mhlanga and Moloi (2020), who stated that 4IR requires re-shaping education's future and working to diversify talents. It is estimated that 65% of children starting primary school now will occupy jobs that do not currently exist (Mhlanga and Moloi 2020). Rîndaşu (2017) explained that the fourth industrial revolution is a wave of change impacting the accounting field and re-shaping the profession This study has highlighted the importance of incorporating 4IR topics into the Financial Accounting curriculum. There is also a need to close the knowledge gap, as the results of this study have indicated that accounting students do not have an in-depth knowledge of 4IR trends like big data, artificial intelligence (AI) and the Internet of Things (IoT). The findings of the study can guide the HEI in determining how well it is equipping accounting students for a working environment that is continually changing as a result of technological developments. The outcomes of this

study can be adapted to other higher education institutions that use accounting-related software packages for teaching and learning. HEIs must periodically assess whether their qualifications are adequately preparing graduates with the relevant and current technological skills.

Thus, the study aims to explore Financial Accounting undergraduate students' knowledge and perception of the Fourth Industrial Revolution at Higher Education Institutions (HEIs) in the KwaZulu-Natal province.

## 2. Literature Review, Theoretical Framework, and Hypothesis Development

### *2.1 The Fourth Industrial Revolution (4IR)*

According to Nel and Kayembe (2019), the Industrial Revolution was a significant development, change or transition in the evolution of human civilization, encompassing everything from the use of machines, telecommunication services and electricity, to new technological innovations. The Fourth Industrial Revolution (4IR), according to Karsten, van der Merwe and Steenekamp (2020), builds on the preceding digital revolution, but it is significantly different in terms of speed, scale and potential disruption to existing, growing organisational models based on a "sharing/on-demand" economy.

The First Industrial Revolution transformed people's lives and economies by transforming a farming and handicraft economy into one influenced by trade and machine production. Oil and electricity aided mass production during the Second Industrial Revolution. In the Third Industrial Revolution, technology was used to computerise production (Xu, David and Kim 2018). The Fourth Industrial Revolution (4IR) is one of the most strongly debated topics amongst academics, researchers, practitioners and policy-makers around the world. According to one study, IR's nine technological pillars are systems integration, big data and analytics, simulation and virtualisation, the Internet of Things, the cloud, cybersecurity, autonomous robots, augmented reality, and additive manufacturing (Coetzee *et al.* 2021).

In order to meet students' current and future needs, new and flexible curricula and teaching approaches are required. The existing structure necessitates a creative re-imagining of the curriculum (Menon and Castrillón 2019). Employers are looking for Financial Accounting graduates who are ready to help steer their organisations to success in today's globally competitive workplace. Higher Education Institutions (HEIs) are responsible for producing graduates with the necessary knowledge, skills and attitudes, as well as graduates who are immediately employable (Arek-Bawa and Reddy 2020). The "Fourth Industrial Revolution" technologies are expected to have a significant impact on learning opportunities, educational policies and instruction procedures (Elayyan 2021).

### *2.2 Higher Education Institutions' (HEIs) response to 4IR*

Although the precise effects of 4IR technology on people and the environment are unknown, it appears that significant and rapid change will occur. The need for higher education to adapt is pressing (Penprase 2018). In the fourth industrial revolution era, higher education is a complex, dialectical and exciting opportunity with the potential to improve society. Artificial intelligence will drive the fourth industrial revolution (Xing and Marwala 2017). A new type of higher education is emerging as a result of the fourth industrial revolution, one that combines teaching, research and service in novel ways. As a result of these advancements, a new type of teacher-student relationship has emerged that does not require a physical location. In online learning environments, physical learning spaces are being replaced by virtual or hybrid learning, which has both advantages and disadvantages (Herrador-Alcaide, Hernández-Solís and Sanguino Galván 2019).

The Fourth Industrial Revolution (4IR) is outpacing and outlasting the Third Industrial Revolution (3IR), which has implications for African Higher Education

Institutions (HEIs) (Fomunyam 2020). South Africa has specific areas of excellence that are propelling the Higher Education Institution (HEI) system into the 4IR, which has the potential to significantly increase access to education. Even though the COVID-19 pandemic wreaked havoc on so many people, it also presented an opportunity to examine how well or poorly implemented technological solutions have performed (Mhlanga and Moloi 2020). Many countries began learning online and using different online platforms and technology in education during Covid-19. This type of learning will become an educational culture over time, and it may even become a viable alternative to traditional (face-to-face) learning. This transition will be aided by 4IR technologies and products (Elayyan 2021).

According to Shahroom and Hussin (2018), the university campus will not survive as a residential institution. HE buildings today are woefully inadequate and entirely unnecessary. As a result, there will be many changes in future teaching and learning approaches, teaching content, as well as academic and student roles. Penprase (2018) argued that Higher Education Institutions (HEIs) must recognise the importance of rapidly adapting to and ramping up new 4IR forms of Accounting education to ensure the environmental and economic sustainability, as well as the relevance, of HEIs as an adaptable and crucial component of the community. Elayyan (2021) estimated that in the near future, it will not be uncommon for robots to deliver a model science lesson or for students to solve mathematics problems using artificial intelligence, thus working and teaching in traditional schools and HE will likely become obsolete.

*2.3 The Financial Accounting profession's response to 4IR*

Financial Accounting is clearly shifting away from traditional accounting work towards newer, more value-added activities like tactical planning, system improvement and product profitability (Asonitou 2015) .Computerization will largely replace jobs previously performed by humans because robots can perform not only routine but also complex tasks. Moreover, Industry 4.0 offers opportunities to those who embrace it. Traditional professions such as accounting face significant challenges as a result of computerization. Accounting practices will be influenced by Industry 4.0 because Accounting professionals will be able to collect previously inaccessible data in real time; improve data integrity through increased precision and timeliness; and improve data efficiency and data assurance, amongst other things (Ghani and Muhammad 2019).

As a result of software development, accountants now have more time to devote to interpreting financial data, and they are more involved in strategic planning (Asonitou 2015). The environment in which accounting professionals work is rapidly changing due to advancements in information technology, information systems and the globalisation of economies. To meet the challenges posed by these changes, HE Accounting programmes must provide graduates with solid technical 4IR knowledge, as well as the ability to find work and contribute to a company immediately (Tan and Laswad 2018).

The rapid advancement of smart technologies has resulted in Industry 4.0. The 'Internet of Things' is an Industry 4.0 component that aims to provide massive amounts of data with seamless interconnectivity. The United States, Japan and China were the first countries to implement Industry 4.0, which is expected to result in a significant decrease in human-intensive labour, potentially leading to high unemployment rates globally, particularly amongst graduates. This is due to the fact that in an Industry 4.0 world, regular jobs would be phased-out in favour of highly skilled jobs (Ghani and Muhammad 2019).

Modern 4IR technology has an impact on both employment and work structures in the accounting profession. Technological advancements can threaten traditional manual jobs, but they can also create new jobs that require highly skilled employees. These employees must constantly improve their skills in order to remain relevant and competitive in the job market (Chuang and Graham 2018). As a result, HEIs must

develop curricula centred on emerging technologies (Penprase 2018). A lack of digital talent can stifle an organization's ambitions for expansion and innovation. Moreover, organisations will hire employees who can effectively use new technologies (Kolding *et al.* 2018).

*2.4 Students' perceptions of 4IR and using accounting technology*

According to Bozalek and Ng'ambi (2015), in order to produce graduates with the desired attributes, Higher Education Institutions (HEIs) must consider technological tools from the perspective of students, as well as the critical role of user-driven initiatives and cloud-based educational opportunities for learning with advanced technology. Elaine Gioiosa and Kinkela (2019) explain that prospective employers seek people who are comfortable with accounting technology and who have strong interpersonal skills, implying that students must believe that they are gaining these 4IR skills at HEIs. According to research, students' perceptions of learning, as cited by Richardson and Shan (2019), are a significant factor driving their learning style, which in turn influences the quality of learning outcomes.

In the new era of technology, the learning strategy has shifted from desktop to laptop, and from laptop to palmtop devices such as mobile phones and tablets (Marzuki *et al.* 2019). According to Ernst and Young (2012), as cited by Richardson *et al.* (2013), the growing use of virtual learning environments, as well as the shift away from "bricks and mortar", has resulted in widespread support for the use of mobile and cloud-based technology in Higher Education Institutions (HEIs). Herrador-Alcaide, Hernández-Solís and Sanguino Galván (2019) discovered that students' perceptions of the online learning environment, as well as their own competence, may influence how satisfied they are with the programme and curriculum as a whole.

Students in Higher Education Institutions (HEIs) perceive the use of technology as an expected and integral component of the learning process. The availability of study materials and the provision of a central location for students to find information or extensive resources relating to each module were cited as major advantages (Concannon, Flynn and Campbell 2005). According to Brooks (2016), as cited by Elaine Gioiosa and Kinkela (2019), students agreed that technology assisted them in successfully completing their qualifications. Stepp-Greany (2002), cited in Elaine Gioiosa and Kinkela (2019), found that approximately 41% of students agreed or strongly agreed that they learned from internet activities.

A focus group study at Botswana's Botho University sought participants' opinions on the implementation of a computerised accounting curriculum (students on internship registered for a Bachelor of Science (Honours) in Accounting). According to all participants, accounting students' employability and self-reliance are improved by a computerised accounting curriculum. The participants also agreed that the majority of them found it difficult to be on an internship without computerised accounting skills. They believed that students with computerised Accounting knowledge and skills were preferred by most employers (Machera and Machera 2017).

Many universities want to use technology in the classroom but, in practice, they are failing. A study that sought to answer the question, "Are Accounting curricula adequately preparing graduates to use technology after graduation?" which came to the following findings (Dingus 2021). In the United Arab Emirates, a study was conducted to identify Higher Education Institution (HEI) students' perceptions of employability skills, in contrast to these perceptions with the employability skills that employers expect in the job market. According to the findings, students do not fully comprehend the employability skills required in the "Fourth Industrial Revolution". As a result, there is a mismatch between future employability skill demand and students' perceptions of that demand (Pauceanu, Rabie and Moustafa 2020).

*2.5 Challenges for higher education in the 4IR era*

The fourth industrial revolution era is both exciting and terrifying. While 4IR has many advantages, it also faces a number of significant challenges. Given its potential to alter job markets, 4IR could lead to increased disparities (Peters 2017). According to some researchers, artificial intelligence will replace more modern jobs and careers than it will create, with half of today's jobs being automated. Employees who possess the necessary skills to deal with new technology will face competition. Therefore, educators must modify the teaching and learning curriculum to reflect these skills (Butler-Adam 2018). Garg (2017) cited (Fomunyam 2019) stated that HEIs will need to have highly skilled and trained faculty staff in order to train students to be experts, which will require significant funding.

Lambert (2017) argued that in addition to the potential for significant job loss brought on by the fourth industrial revolution, there are a number of other issues to address, including cybersecurity, hacking and risk aversion. Fomunyam (2019) concluded that it is more challenging to create integrated curricula that cover all 4IR technologies because the fourth industrial revolution blurs the boundaries between the digital, physical and biological spheres.

*2.6 Africa's responses to Fourth Industrial Revolution challenges*

-Developing physical and digital infrastructure:

Infrastructure factors like a lack of electricity and low tele-density, internet density and broadband penetration limit access to advanced technology in Africa. Mobile and internet usage consequently continues to be minimal. Other technological bottlenecks include being vulnerable to cyberattacks and the lack of standardised application programming interfaces and common data languages for the increased integration of largely independent systems. Accelerating fibre-optic network physical connectivity and virtual platform interoperability is essential for both modernising technology on the continent and lowering unit costs for under-served populations. African governments and entrepreneurs must identify new industrial niches; capitalise on them to achieve sustainable, inclusive growth; and take decisive action to close the gaps in digital infrastructure, research and development, as well as digital skills (Ndung'u and Signé 2020).

-Fixing the labour-skills mismatch:

Many governments are hesitant to support technologies that threaten existing jobs because creating jobs for Africa's burgeoning youth population is a priority in most African countries. Some current technologies tend to replace low-skilled workers, of which Africa has a surplus, with higher-skilled workers, limiting 4IR participation to economies with the relevant skills. African governments must invest in education and skills development programmes to ensure that technology supplements, rather than replaces, labour (Ndung'u and Signé 2020).

-Innovative elements to the educational curriculum:

The fourth industrial revolution requires an educational design framework with a strong overlay of critical thinking on rapidly evolving technologies. Graduate students at any Higher Education Institution (HEI) should have the abilities and skills to create a culture that improves the sustainability of advanced technology in a thoughtful and responsible manner. In response to the volatility of the labour market, a new framework was developed. This framework shifts the emphasis of the traditional academic curriculum from routine tasks to more creative activities (Yusuf, Walters and Sailin 2020).

-Real-time classrooms to support teaching and learning:

Many studies on the professional development of converting higher education institutions to 4IR institutions focus on a training format such as Learning Management Systems (LMS). The LMS allows HEIs to effectively deliver training by establishing

student groups, mentoring and support communities. HEIs must consider the best online practices for developing meaningful professional development activities, such as teaching. By assisting teachers in automating mundane paperwork, technology enhanced learning relieves them of the burdensome task of administrative and bureaucratic responsibilities (Yusuf, Walters and Sailin 2020).

## 3. Research Method

A quantitative questionnaire was distributed to undergraduate students, specifically Financial Accounting 3 students enrolled for the Diploma in Accounting at a Higher Education Institution (HEI) in Durban, KwaZulu-Natal. Financial Accounting III students were chosen for this study because the subject, Financial Accounting, is their chosen field of specialisation. Furthermore, these third-year level students' responses as an exit-level group were deemed particularly significant due to their familiarity and experience with the curriculum and programme. In addition, the Diploma in Accounting was the only exit-level programme being offered at the department.

The study used the census method whereby the survey questionnaire was created in Microsoft Forms, and a link to it was sent to all students registered for Financial Accounting III. The census approach is appropriate for gathering data from a small population (Chawla and Sondhi 2011). The questionnaire link was distributed to all students via an online notification from the module lecturers. The Microsoft Forms questionnaire settings were purposefully set to allow only students with a valid university email address to gain access to the online link, with only one attempt at answering the quantitative questionnaire from 10 May 2022 to 5 June 2022.

The quantitative method was used in this study. This strategy was implemented through a survey that used a closed-ended questionnaire (five-point Likert scale), which was completed by 172 students from a sample population of 257. A clearance letter and gatekeeper's permission obtained from the institution's research committees were included as documents in the data administration process. Student participation was entirely voluntary, and their anonymity was maintained. Therefore, ethical considerations were taken into account, and the appropriate ethical clearance was obtained from the university's Faculty Research Ethics Committee (FREC). The questionnaire was created in accordance with the aim of the study. A pilot study was carried out before the research questionnaire was distributed. The questionnaire was created to be uncomplicated and easy to grasp for the students. As a result, face and content validity can be considered to be addressed in this study. The reliability rating of the questionnaire of .831 was found to be higher than the recommended Cronbach's alpha value of 0.7, indicating that the research has an acceptable and consistent level of scoring. Furthermore, a qualified quantitative statistician was consulted prior to data administration which supported the validity and reliability of the study. In addition, SPSS version 25.0 was used to analyse the data collected from the respondents.

## 4. Results

### *4.1 Descriptive data analysis: Knowledge of the Fourth Industrial Revolution (4IR)*

Figure 1. below shows students' knowledge of the Fourth Industrial Revolution. The questionnaire assessed the respondents' knowledge of the Fourth Industrial Revolution (4IR). Respondents rated their knowledge on a five-point Likert scale with statements (also known as items) ranging from 'Strongly disagree' to 'Strongly agree'.

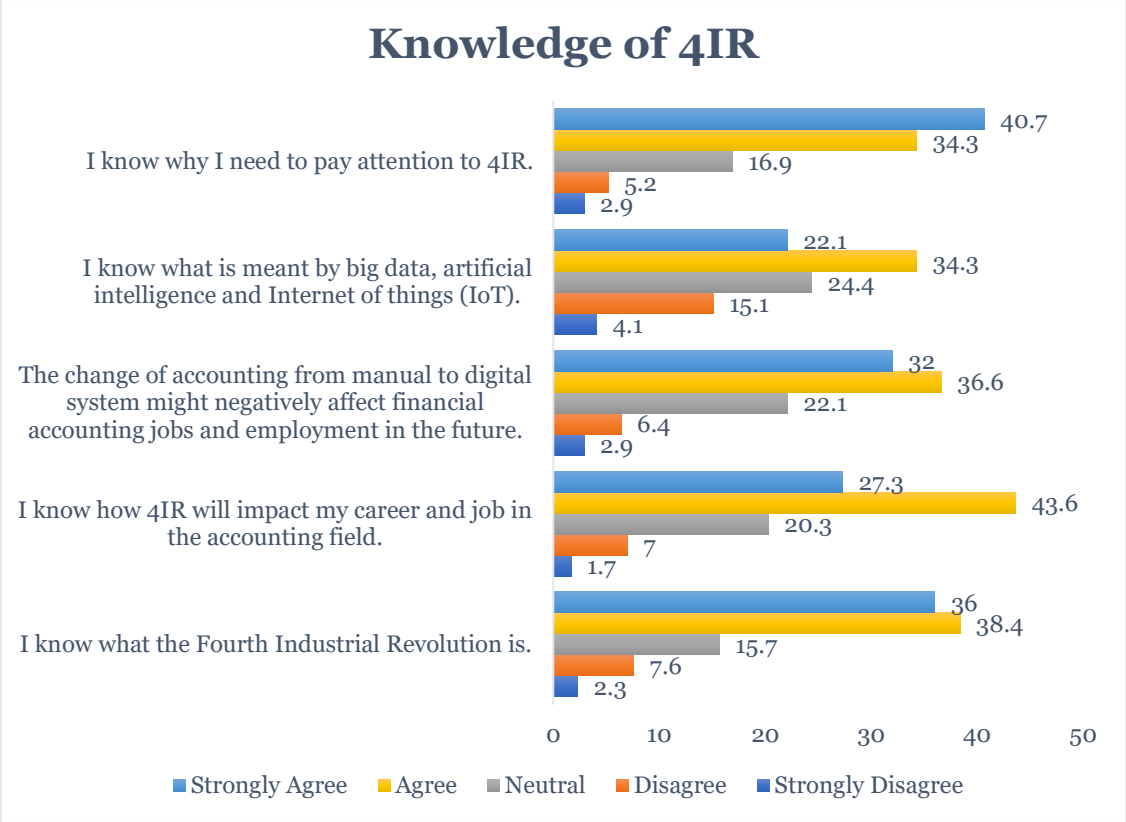


**Figure 1.** Respondents' knowledge of the Fourth Industrial Revolution (4IR)

The findings shown in Figure 1 revealed that:

- 75% of students (40.7% 'strongly agree' + 34.3% 'agree') agreed that they understand why they should pay attention to 4IR;
- 74.4% (36% answered 'strongly agree' and 38.4% 'agreed') indicated that they were knowledgeable about the Fourth Industrial Revolution;
- 70.9% of students (27.3% 'strongly agree' + 43.6% 'agree') understand how 4IR will affect their career and work in the accounting field;
- 68.6% of students (32% 'strongly agree' + 36.6% 'agree') thought that the transition from a manual to a digital accounting system might have a negative impact on employment and careers in Financial Accounting in the future; and
- 56.4% of students (22.1% 'strongly agree' + 34.3% 'agree') agreed that they understand what big data, artificial intelligence and the Internet of Things (IoT) are.

It is important to note that the students understand the importance of 4IR and how it will affect their future careers. The data analysis revealed that students are knowledgeable about the Fourth Industrial Revolution and its impact on the Accounting industry. However, students' knowledge of 4IR is limited as data analysis revealed that only 56.4% of students (22.1% 'strongly agree' + 34.3% 'agree') understand what big data, artificial intelligence and the Internet of Things (IoT) are. Furthermore, it is interesting to note that 68.6% of students agreed that the transition from a manual to a digital Accounting system will have a negative effect on future employment and careers in Financial Accounting.

*4.2 Inferential analysis: Students' perception of 4IR*

A one-sample t-test was used to compare the average agreement scores with the central/neutral score of '3' in order to determine whether there is significant agreement or significant disagreement. The highest mean indicates that the majority of respondents agreed on that variable. The lowest standard deviation indicates that ideas

on the specific variables are stable (respondents agree with each other). The greater the magnitude of T (over 2), the more evidence there is of a significant difference. A p-value less than 0.05 ($p < 0.05$) indicates that the results are statistically significant. A p-value less than 0.001 ($p < .001$) indicates that the results are statistically highly significant and a p-value greater than 0.05 ($> 0.05$) indicates that the results are not significant.

Table 1 below summarises respondents' knowledge of the Fourth Industrial Revolution.

**Table 1.** Perception of the Fourth Industrial Revolution (4IR)

| Item | Responses as Frequency (%) Strongly disagree | Disagree | Neutral | Agree | Strongly agree | N | Mean (SD) | t # | Df | p-value <.001* |
|---|---|---|---|---|---|---|---|---|---|---|
| 5.1 I know what the Fourth Industrial Revolution is. | 4 (2.3) | 13 (7.6) | 27 (15.7) | 66 (38.4) | 62 (36.0) | 172 | 3.98 (1.017) | 12.668 | 171 | |
| 5.2 I know how 4IR will impact my career and job in the accounting field. | 3 (1.7) | 12 (7.0) | 35 (20.3) | 75 (43.6) | 47 (27.3) | 172 | 3.88 (0.950) | 12.115 | 171 | <.001* |
| 5.3 The change of accounting from manual to digital systems might negatively affect financial accounting jobs and employment in the future. | 5 (2.9) | 11 (6.4) | 38 (22.1) | 63 (36.6) | 55 (32.0) | 172 | 3.88 (1.028) | 11.037 | 171 | <.001* |
| 5.4 I know what is meant by big data, artificial intelligence and the Internet of Things (IoT). | 7 (4.1) | 26 (15.1) | 42 (24.4) | 59 (34.3) | 38 (22.1) | 172 | 3.55 (1.115) | 6.498 | 171 | <.001* |
| 5.5 I know why I need to pay attention to 4IR. | 5 (2.9) | 9 (5.2) | 29 (16.9) | 59 (34.3) | 70 (40.7) | 172 | 4.05 (1.025) | 13.391 | 171 | <.001* |

# One-sample t-test: mean compared to '3'
* Significant at 95% level

The results in Table 1 indicated that:

- The mean scores for all items differ significantly from '3'. All of the scores are greater than 3, indicating a significant agreement with all statements regarding the respondents' knowledge of 4IR.
- The means and standard deviations ranged from $M$ = 4.05, $SD$ = 1.115 (the highest), to $M$ =3.55, $SD$ = 0.017 (the lowest).
- I know why I need to pay attention to 4IR: M = 4.05, SD = 1.025; t (171) = 13.391; p<.001.
- I know what the Fourth Industrial Revolution is: $M$ = 3.98, $SD$ = 1.017; t (171) = 12.668; p<.001.
- I know how 4IR will impact my career and job in the accounting field: $M$ = 3.88, $SD$ = 0.950; t (171) = 12.115; p<.001.
- The change of accounting from manual to digital systems might negatively affect Financial Accounting jobs and employment in the future: $M$ = 3.88, $SD$ = 1.028; t (171) = 11.037; p<.001.
- I know what is meant by big data, artificial intelligence and the Internet of Things (IoT): $M$ = 3.55, $SD$ = 1.115; t (171) = 6.498; p<.001.

Inferential data analysis revealed that respondents significantly agreed with the statement regarding the "Fourth Industrial Revolution" as all mean values are above '3'. It is important to note that students significantly agreed with the statement that the transition of accounting from manual to digital systems may have a negative impact on Financial Accounting jobs and employment in the future, with a mean value of M = 3.88. This indicates that students are concerned about job security in the accounting sector.

The inferential data analysis indicated that the statements: 'I know why I need to pay attention to 4IR' and 'I know what the Fourth Industrial Revolution is' had the highest mean values (M = 4.05 and M = 3.98 respectively). These are significant findings because they show that Financial Accounting students understand the impact of the Fourth Industrial Revolution on the Accounting industry. The statement 'I know what is meant by big data, artificial intelligence and the Internet of Things (IoT)' had the lowest mean value (M = 3.55).

*4.3 Discussion*

The literature suggested that in order for Higher Education Institutions (HEIs) to give students an education that prepares them for the demands and challenges of 4IR, more flexible curricula and teaching methodologies are necessary (Menon and Castrillón 2019). It is important to note that the students understand the importance of 4IR and how it will affect their future careers.

Understanding how accountants' roles are changing is important so that students can be equipped with the necessary skills that will be useful in a job market influenced by technological advancements. Figure 1 revealed that students are knowledgeable about the Fourth Industrial Revolution and its impact on the Accounting profession. However, these Financial Accounting 3 students' knowledge of 4IR is limited, as data analysis (Figure 4.1.) revealed that only 56.4% of students (22.1% 'strongly agree' + 34.3% 'agree') understand what big data, artificial intelligence and the Internet of Things (IoT) are. Furthermore, it is interesting to note that 68.6% of students agreed that the transition from a manual to a digital Accounting system will have a negative effect on future employment and careers in Financial Accounting. As routine Accounting duties and activities have become increasingly automated, the underlying role of the accountant has changed to include critical thinking, problem-solving and analytical skills, which all require higher-order thinking capabilities (Terblanche and De Clercq 2021).

Table 4. 1. on the inferential data analysis revealed that respondents significantly agreed with the statement regarding Knowledge of the Fourth Industrial Revolution, since all mean values were greater than '3.00'. Notably, students strongly

agreed with the statement that the transition of Accounting from manual to digital systems may have a negative impact on Financial Accounting jobs and employment in the future, with a mean value of M = 3.88. This indicates that students are concerned about job security in the Accounting sector. In addition, these findings are consistent with Chuang and Graham (2018) findings that technological advancements can jeopardise traditional manual jobs. Industry 4.0 is expected to result in a significant decrease in human-intensive labour, potentially leading to high unemployment rates globally, particularly amongst graduates. This is due to the fact that, in an Industry 4.0 world, routine jobs will be phased-out in favour of highly skilled jobs (Ghani and Muhammad 2019).

Table 4.1. also indicated that the statements: 'I know why I need to pay attention to 4IR' and 'I know what the Fourth Industrial Revolution is' had the highest mean values (M = 4.05 and M = 3.98 respectively). These are significant findings because they show that Financial Accounting students understand the impact of the "Fourth Industrial Revolution" on the Accounting profession. These findings contradict those of Pauceanu, Rabie and Moustafa (2020) that students are not fully aware of "Fourth Industrial Revolution" employability skills. The statement 'I know what is meant by big data, artificial intelligence and the Internet of Things (IoT)' had the lowest mean value (M = 3.55). These findings indicate that some students lack a thorough understanding of 4IR trends. This is concerning because, as a result of technological advancements, the Accounting profession is clearly shifting away from traditional Accounting working activities towards newer and more value-added activities (Asonitou 2015).

The study met its stated aim by demonstrating that a significant number of students understand 4IR and how it affects their careers. There were several parallels between the study's findings and the literature review. The literature review indicated that students do not fully comprehend the employability skills needed in the Fourth Industrial Revolution. As a result, there is a misalignment between future demand for employability skills and students' perceptions (Pauceanu, Rabie and Moustafa 2020). However, the study's findings revealed that students understand the significance of 4IR and how it will affect their future careers. According to Figure 4.1., 70.9% of students (27.3%'strongly agree' + 43.6% 'agree') agreed that they understand how 4IR will affect their careers and work in the Accounting field. Furthermore, the findings revealed that only 56.4% of students (22.1%'strongly agree' + 34.3% 'agree') understand what big data, artificial intelligence and the Internet of Things (IoT) are. Furthermore, it is interesting to note that 68.6% of students agreed that the transition from a manual to a digital Accounting system will have a negative effect on future employment and careers in Financial Accounting. As routine Accounting duties and activities have become increasingly automated, the underlying role of the accountant has changed to include critical thinking, problem-solving and analytical skills, which all require higher-order thinking capabilities (Terblanche and De Clercq 2021). The findings of the study indicated that while 4IR topics are covered in the Business Information Systems curriculum, 4IR trends are not covered in depth because students are not well-versed in these topics. Furthermore, these findings revealed that more than 60% of students have negative perceptions of 4IR, believing that it will have a negative impact on their future employment. In-depth teaching of 4IR would have made students aware that 4IR will create new opportunities for employees whose skills align with emerging technologies and who are willing to be retrained to adopt new technology.

*4.4 Recommendation*

Recommendation 1: Review the current curriculum towards the development of knowledge and skills

It is recommended that the university implement a project with multiple stages, including evaluating the current curriculum, developing curriculum proposals, getting the proposals approved, implementing the changes, and assessing the effects of the changes. Participating in this project will ensure that undergraduate students have a

thorough understanding of the Fourth Industrial Revolution and its impact on the Accounting profession.

Recommendation 2: Establishment of an Accounting technology committee

Accounting education can benefit from the involvement of employers, entrepreneurs and Accounting professional bodies. Accounting professionals are aware of which technologies are current and useful, and employers and entrepreneurs are aware of which technical accounting skills Accounting graduates should possess in the workplace. It is therefore recommended that links be established with Accounting professional bodies and recruiters, with the specific mandate of determining what technological knowledge and skills the Diploma in Accounting graduates require. This would not be an advisory board, but rather a committee driven by technological advancements, digital transformation, and the impact of the Fourth Industrial Revolution.

## 5. Conclusion

The paper used both descriptive and inferential analyses to investigate undergraduate students' knowledge of the Fourth Industrial Revolution at a Higher Education Institution (HEI) in KwaZulu-Natal. The study's population was limited to third-year students enrolled in Financial Accounting III since the Diploma in Accounting was the only exit-level programme offered during data administration. The findings revealed that a significant number of Financial Accounting students understand what the Fourth Industrial Revolution is and how it impacts their accounting careers. The research implications have shown that there is a need to bridge the knowledge gap since these findings have shown that accounting students lack an in-depth knowledge of 4IR trends and technologies such as big data, artificial intelligence (AI) and the Internet of Things (IoT). The fourth industrial revolution necessitates a higher education curriculum design framework with a strong overlay of critical thinking on rapidly evolving technologies. This would ensure that undergraduates from any HEI would be able to navigate a work environment and career influenced by advanced technology driven by the fourth industrial revolution. The traditional South African HE curricula and programmes must transform to become creative and include digital activities which will support and embrace the 4IR Financial Accounting curriculum framework. However, there are limitations since these findings may not apply to all HEIs, and the primary data collection instrument was a quantitative questionnaire which was administered to undergraduate students only. A recommendation for future study could focus on other variables like post-graduate students or academics at different HEIs, or focus on how 4IR has impacted accounting education and the Accounting profession in South Africa.

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