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Quality Assurance Practices Adopted by Higher Education Institutions for Online Teaching and Learning in the Forth Industrial Revolution: A Systematic Review

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Abstract

Higher Education Institutions (HEIs) have been compelled to embrace online platforms due to the current methods of teaching and learning, utilising technology in the Fourth Industrial Revolution (4IR). This rapid transition involves a change from primarily conducting lessons in person to providing classes online using diverse platforms including Microsoft Teams, Zoom, and Moodle. Online teaching and learning primarily involves academic strategy and educational design, which in turn impact the Quality Assurance (QA) practices used by HEIs. This study examined the QA practices for online teaching and learning at HEIs in the 4IR period. Using a systematic review methodology, the paper comprehensively analysed and synthesise the available literature and research results related to the phenomenon being investigated. Keywords, synonyms and subject headings were utilised to search three electronic databases between 2020 and 2024. The electronic databases consisted of Emerald insight, Google Scholar and ProQuest. The screening of the publications was done using tittles and abstracts, thereafter the full text articles were assessed for the eligibility criteria. The findings were extracted and integrated in a narrative synthesis from eighteen articles.

Keywords: *Higher education, Quality assurance, Teaching and learning, 4IR*

1. Introduction

The emergence of the 4IR has compelled HEIs worldwide to transition from conventional teaching methods to using online platforms, hence influencing the practices of Quality Assurance (QA). UNESCO (2020), suggests that the technological transformation has also had an impact on the education of about 50% of students worldwide. Currently, internet technologies are mostly used for virtual and asynchronous learning in the South African HEIs, and the combination of these tools with in-person classroom teaching is known as blended learning (Bonfield *et al.*, 2020). This research analyses online learning and the methodologies used by HEIs for quality assurance in the platforms they prescribe. These platforms consist of Microsoft Teams, Moodle, and Zoom. Students may conveniently access these platforms from the comfort of their own surroundings utilising their smartphones or personal computers. Cognisant of the foregoing argument, there are various factors associated with QA in online teaching and learning, such as digital literacy, student engagement, assessment integrity, measuring learning outcomes, maintaining the academic standards as well as the adaptation to technological changes amongst many (Staring *et al.*, 2022). As a result, there have been obstacles to

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overcome, and they consist of accessibility, affordability, flexibility, learning pedagogy as well as lifelong learning when using online platforms for teaching and learning. As a means to address the negative perceptions of teaching and learning online, such as its reputation for being of poor quality and having low standards, as well as the perception that it is technologically sophisticated, it is necessary to implement a QA system for online, real-time educational institutions.

This study argues that QA is an essential need that enables the creation and sharing of creative information, with the goal of integrating into the current practices adopted by HEIs for teaching and learning in the 4IR. Which has now become the primary approach taken by HEIs to ensure quality and accomplish their goals in teaching and learning amongst others. Dawson (2020) asserts that advocating for the implementation of QA measures to guarantee that students acquire and comprehend essential information while upholding honesty. A significant number of scholars globally focused on quality assurance for quality assessments in online platforms (Doherty 2021; Cheng 2021). On this, Heil and Ifenthaler (2023) conducted a study on assessments conducted online in higher education. There is a substantial amount of research in Africa that specifically examines online teaching and learning. However, there is a scarcity of literature about quality assurance practices used by higher education institutions for online teaching and learning. The above remarks emphasise a gap in literature, and this paper emphasises the relevance of QA in online teaching and learning in South Africa. Nonetheless, the predicament becomes more intricate when addressing HEIs in South Africa (SA), since the nation has significant societal challenges that hinder the complete adoption of online learning and the fourth industrial revolution (4IR). Therefore, it is necessary to implement evaluation methods to effectively assess the influence of the methods of teaching and learning in HEIs. The study seeks to answer the following question:

- What are the most reliable techniques for quality assurance practices in online learning and teaching during the Fourth Industrial Revolution (4IR)?

The section concentrated on examining the efficacy of practices in connection to the policies, methods, strategies, and processes used for quality assurance. Additionally, it assesses the difficulties encountered by higher education institutions (HEIs) regarding the efficient utilisation of online learning and teaching processes. This research argues that quality assurance methods and practices are of equal importance in maintaining and enhancing the effectiveness of online learning.

1.1. Conceptualising Quality Assurance For Online Teaching and Learning

The 4IR is fundamentally reshaping HE via the integration of physical, digital, and biological domains. Furthermore, the Covid-19 pandemic has compelled higher education (HE) professionals to fully use online teaching methods (Ramírez-Hurtado *et al*., 2021). Calma and Dickson-Deane (2020) argue that in the emerging phenomena, lecturers are confronted with the task of effectively managing the intricacies of teaching, evaluating, and enhancing academic honesty. Academics should be provide training on how to effectively utilise technology in teaching, learning, and evaluation to ensure high quality outcomes across the entire module content delivery process (Gamage *et al*., 2020). Students must also be provided with training opportunities to adjust to the new phenomenon of online learning. Cognisant of the foregoing argument, researchers confirm that the predominant measure of technological advancements in the 4IR are having profound effects on every aspect of our humanity and society, including the procedures involved in corporate operations (Petronzi and Petronzi, 2020). The role of digital technologies in HEIs encompasses various tasks such as creating course materials, distributing and presenting these materials through methods like PowerPoint presentations, facilitating communication among learners. Examples of digital technologies used for teaching and learning include social media platforms, online discussion boards, instant messaging services, Massive Open Online Courses (MOOCs), video and screen capture tools, videoconferencing applications, and subject aggregators (Richardson *et al*., 2020).

The main objective of quality assurance in online learning is to deliver optimal outcomes for a student population that actively engages with technology, particularly for academic learning. Monitoring and evaluation of the alignment between learning objectives, instructional materials, and assessments is conducted according to stringent quality assurance standards. In order to ensure that students possess the required knowledge, abilities, and capabilities to succeed in the rapidly evolving digital environment of today, the curriculum lays a strong emphasis on its relevance and up-to-datedness within the framework of the 4IR.

Accurate and dependable evaluation methods that accurately measure student performance are crucial for ensuring the quality of online learning (Martin and Borup, 2022). Mehta and Aguilera (2020) highlights that assessments and

learning goals should align consistently, employing a diverse range of assessment methods such as quizzes, projects, and debates, while also providing valuable feedback. In order for students to demonstrate their competencies effectively, quality assurance frameworks emphasise the importance of using realistic and real-world assessments that align with the requirements of the 4IR. Quality assurance in online learning ensures a reliable technological infrastructure, which is essential for the success of the 4IR. Institutions can equip students with the necessary resources to thrive in the ever-changing digital landscape of the Fourth Industrial Revolution by upholding quality assurance standards.

1.2. The Relevance of Quality Assurance Online Teaching and Learning

Many HEIs have made significant expenditures in the development of online teaching and learning. Various strategies have been implemented and integrated into higher education to evaluate and enhance the quality of teaching and learning practice. These include the use of survey instruments to collect formal feedback from students, which is then used to assess and provide feedback on teaching and learning methods (Fabriz *et al*., 2021). Additionally, there has been the implementation of both summative and formative peer review processes for evaluating teaching and learning. Amidst a growing emphasis on accountability in the public sector, governments in several countries within the Organisation for Economic Co-operation and Development (OECD) have sought to implement quality assurance audits for higher education, specifically focusing on teaching activities (Coman *et al*., 2020). This includes teaching and learning practices online. Therefore, it is necessary to implement evaluation methods to effectively assess the influence of the methods of teaching and learning in higher education institutions (HEIs).

Online education is essential in meeting advanced demands of teaching and learning by increasing the accessibility and adaptability of education. It promotes lifelong learning by allowing students to advance at their own pace as they acquire knowledge and skills. The Fourth Industrial Revolution (4IR) emphasises the importance of having a strong understanding of digital literacy and being conversant with future technology (Carrillo and Flores, 2020). Both of these skills can be developed by utilising online learning platforms. It is crucial to acknowledge the significance of online learning in transforming our educational system, especially during the Fourth Industrial Revolution (4IR), which is marked by disruptive technological advancements. Online learning has transformed accessibility, personalised learning, skill development, collaboration opportunities, and adaptability, making it a pivotal factor driving the transformation of education in the Fourth Industrial Revolution (4IR). Online learning undergo quality assurance assessments to ensure they meet high standards and offer valuable learning experiences. It encompasses a diverse array of elements, including the creation of educational plans, the provision of teaching materials, the implementation of assessment methods, and the provision of assistance to students.

1.3. Policy Frameworks Informing Quality Assurance in Online Teaching and Learning

Currently, several HEIs have distinct policies for teaching and learning, e-learning, and assessments. HEIs need to formulate a comprehensive teaching-learning policy. Technology is becoming an integral part of the teaching and learning process. While many HEIs are using technology to enhance teaching and learning, the 4IR goes beyond the mere use of computers and has the capacity to fundamentally change the way teaching, learning , and interactions takes place (Chan, 2023). Most quality assurance frameworks have requirements that emphasise the need of logical and consistent course navigation in online courses. In order for the QA system to be implemented, it is necessary to have policies and procedures (regulatory frameworks) that provide guidance that the intended goals are achieved (Rajabalee and Santally, 2021). In the context of higher education in South Africa, several legislative frameworks such as the South African Qualifications Authority Act, the Skills Development Act, and the Higher Education Act emphasise the importance of quality assurance in achieving important national goals of transformation, and development in higher education (Ahshan, 2021).

The Higher Education Act 101 of 1997 provides explicit instructions on the manner in which higher education should be reorganised, taking into account the historical context of discriminatory exclusion in the country. It emphasises the importance of quality and the function of quality assurance in a reformed higher education system. This includes adhering to specific expectations and requirements, as well as striving for ideals of excellence. The expectations and aspirations may vary based on the setting, influenced in part by the precise goals being sought. The South African Qualifications Authority Act 58 of 1995 (SAQA) plays a crucial role in overseeing and maintaining the quality of qualifications in South Africa. Quality assurance, as defined by SAQA, involves ensuring that qualifications are of a

high standard and meet specified criteria. Higher education institutions should bear the major responsibility for quality assurance through the implementation of a quality assurance system. The act includes provisions for the development and implementation of a National Qualifications Framework (NQF), with the aim of establishing the South African Qualifications Authority. The objectives of the NQF are to establish a comprehensive national framework for recognising learning accomplishments, promote access to and movement within education, training, and career paths, improve the quality of education and training, address historical inequalities in education, training, and employment opportunities, and ultimately support the holistic development of each learner and the overall social and economic progress of the nation (Gaebel *et al*., 2021).

Skills development Act 97 of 1998 indirectly influences quality assurance in teaching and learning in higher education through its emphasis on skills development and the broader educational landscape in South Africa. The focus remains on ensuring that institutions and programs meet specified standards to uphold the quality of education and training provided to students across the country. These regulations are among many other legislations that informs and influences higher education quality assurance. These frameworks offer a broader perspective of quality assurance to ensure that higher education programmes for undergraduate and postgraduate levels are relevant and responsive to the needs of the labour market. However, there is an important gap in current literature and frameworks concerning higher education quality assurance, particularly in the context of online teaching and learning. With the rapid growth of online learning, there is a pressing need to develop frameworks that specifically cater to the quality assurance of online teaching and learning. Addressing this gap will not only support the ongoing evolution of educational delivery methods but also ensure that online programmes meet rigorous standards of quality and relevance (Hofer *et al*., 2021).

1.4. Quality Assurance Practices in Teaching and Learning

Different models can function as both a method of delivering education and a tool for evaluating to improve the quality of teaching and evaluations. Generally, Higher Education Institutions (HEIs) employ many methods to guarantee the quality of teaching and learning. One such method is to verify that the curriculum is suitable for its intended purpose. Faculties and departments should establish curriculum committees to routinely oversee the implementation and evaluation of programmes and courses. This would guarantee that institutions stay updated with the relevance of learning outcomes and courses that are pertinent and responsive to the market (Seyfried and Pohlenz, 2020).

Tamsah *et al*. (2021) confirms that societal needs and advancements in knowledge necessitate corresponding modifications in the curricula and courses offered by institutions. The primary objective is to guarantee the alignment of the projects with the requirements and demands of society. Graduates possessing knowledge and skills that are not applicable to the current needs of society are not valuable. Therefore, it is crucial to consistently align university academic courses with the evolving demands of society. Curriculum committees that possess a comprehensive understanding of their function will have the ability to thoroughly examine and modify curricula as necessary.

Evaluation of teaching and learning by students and instructors is a crucial internal process for ensuring the quality of education (Wang *et al*., 2024). Oke and Fernandes (2020) highlight that the evaluation of instruction by students provide the chance to assess the lecturer's strengths and weaknesses. This also demonstrates the lecturer's responsibility to students, as they will need to rectify any mistakes in order to improve the quality of teaching and learning. In the context of assessment of teaching by students, feedback helps the lecturer comprehend the students' requirements and adjust their teaching methods accordingly. Presently, the these methods apply in a traditional face-to-face teaching and learning.

In order to properly implement and oversee the quality assurance of online learning, academic administrators and instructors must utilise suitable technologies and methodologies that enable them to gather, analyse, and document data and evidence pertaining to the quality of online learning. The tools and methods encompassed in this category may consist of surveys, rubrics, analytics, dashboards, portfolios, and audits. Nevertheless, these tools and methods present certain difficulties, including the need to guarantee their validity, reliability, and usability; the challenge of striking a balance between quantitative and qualitative data; the task of addressing ethical and privacy concerns; and the utilisation of data and evidence to inform decision-making and improvement efforts.

1.5. Impediments In Quality Assurance For Online Teaching And Learning

The Fourth Industrial Revolution (4IR) has brought about significant advancements in online learning, while also presenting new challenges in terms of ensuring quality. Online courses and certifications are subject to significant

scepticism regarding their truthfulness and credibility. The significance of recognising and verifying certificates and degrees has increased with the widespread growth of online learning (Regmi and Jones, 2020). Additionally, there is the issue of assessing the advancement in online courses. Traditional methods of evaluation, such as exams, may not always be feasible in online learning environments. Issues related to accessibility can arise due to factors such as limited internet connectivity, technological barriers, or disabilities. An essential aspect of online education is the presence of high-quality technology infrastructure, including reliable internet connectivity, effective learning management systems, and efficient communication tools. Nevertheless, there are substantial deficiencies in technical infrastructure to support the development online learning. Ensuring a reliable and uninterrupted technological framework for online learning is very challenging in the context of the higher education, in South Africa (Mukuna and Aloka, 2020). The evolving demands of the Fourth Industrial Revolution (4IR) present a difficulty for ensuring quality by creating and executing assessments that align with these demands, such as project-based assessments, simulations, portfolio assessments, and authentic real-world assignments. One of the main challenges in quality assurance is finding the right balance between scalability, efficiency, and meaningful assessment.

Another difficulty in quality assurance for online learning include the assurance of academic integrity and staying abreast of technology changes (Landa *et al*., 2021). The contention is that the dangers of academic dishonesty linked to online learning pose challenges in guaranteeing equitable treatment for every student. Robust measures, such as plagiarism detection software, secure online tests, and identity verification methods, must be incorporated into quality assurance practices to effectively identify and discourage academic dishonesty. Ensuring academic integrity and retaining student confidence are crucial for the legitimacy and reputation of online learning programmes. It is important to note that the rapid pace of technological advancements in the Fourth Industrial Revolution constantly poses challenges to quality assurance in online learning. Institutions should periodically review and enhance their quality assurance protocols to accommodate the advent of novel technologies, tools, and platforms. To ensure the educational worth and compatibility with student needs of online learning, quality assurance activities must stay updated with the latest technological advancements, closely observe developing patterns, and integrate them proficiently.

2. Methodology

A literature review identifies research gaps and uncovers areas that previous studies have not thoroughly investigated. Similarly, a systematic literature review is a review that is guided by clear research questions, defines and examines relevant studies, and ultimately evaluates the quality of the studies according to specified criteria (García-Holgado *et al*., 2020). A systematic review of literature was done to collect relevant information about quality assurance practices adopted by universities for online teaching and learning in the Forth Industrial Revolution. According to Booth *et al*. (2021) systematic reviews serve several important purposes, including providing thorough summaries of existing knowledge in a certain topic and helping to identify future research priorities. Systematic literature reviews prioritise the collection of a comprehensive and representative body of relevant literature. This information is then carefully evaluated based on specific eligibility and selection criteria to determine its suitability for inclusion in the analysis (Chong *et al*., 2022). The ultimate goal is to provide a more thorough and comprehensive research.

A literature review is a systematic procedure that encompasses several actions such as searching, identifying, reading, summarising, assembling, analysing, interpreting, writing (including citation based on a pre-established research topic), and referencing. A literature review is supposed to be scientific in its purpose, procedure, structure, and outcome, regardless of the method used to conduct it. Scientificity is achieved by adhering to a methodical framework of reasoning (Zhao *et al*., 2021). It has the ability to tackle questions that cannot be sufficiently answered by individual studies alone and identify shortcomings in primary research that need to be solved in future studies. Furthermore, the ability to construct or evaluate ideas regarding the mechanisms or reasons behind observable occurrences. To address the research topics mentioned, this paper conducts a comprehensive examination of existing literature using a systematic review. To achieve the objective of the systematic review, a protocol called Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) was created. This protocol aims to conduct a thorough inquiry by finding relevant literature on the obstacles faced in implementing online teaching and learning at higher education institutions. The Figure 1 illustrates the flowchart that outlines the process of identifying, filtering, including, and excluding items.

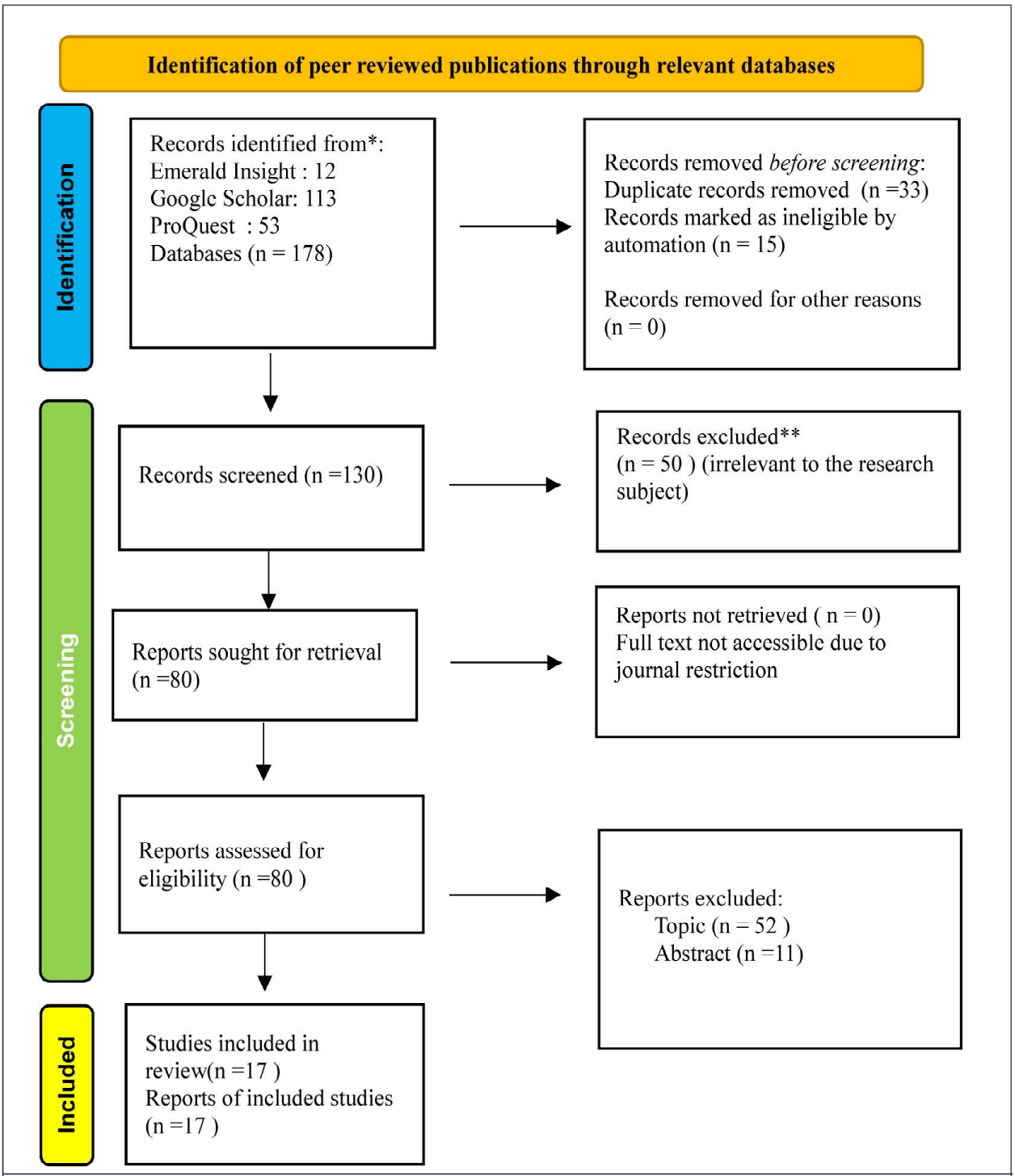

Figure 1: PRISMA Flowchart

Source: Generated by Authors.

2.1. Search Strategies and Data Sources

A literature review identifies research gaps and uncovers areas that previous studies have not thoroughly investigated. Similarly, a systematic review is a review guided by clear research questions, defines and examines studies, ultimately evaluates the quality of the studies according to a specific criteria. The systematic review enabled the study to systematically analyse and integrate the existing evidence and information from different publications. The publications utilised in this paper were obtained by an extensive search of previous studies conducted via online databases, which encompassed Emerald insight, Google scholar and ProQuest (Figue 1). Although other techniques exist for conducting literature search and retrieval, such as physical searches and reference checks, electronic databases have emerged as the primary approach due to their superior convenience and efficiency. The study utilised various keywords to search for relevant literature.

Table 1: Search Strategies and Data Sources	
Database	**Keywords**
Emerald Insight	%22Quality+assurance%22+universities+online+teaching+and+learning+in+the+4IR&ipp =50&p=1&facet-content-type=article
Google Scholar	"Quality assurance" practices "universities" "online teaching and learning" 4IR
ProQuest	"Quality assurance" "universities" "online teaching and learning" "4IR"
Source: Generated by Authors Based on Literature Review.	

2.2. Inclusion and Exclusion

Inclusion criteria refers to the specific requirements that a study must meet in order to be considered for inclusion. Exclusion criteria refer to the specific circumstances that would render a study ineligible for inclusion. The systematic review is delimited by the inclusion and exclusion criteria. The research criteria are often established after formulating the research topic, however preliminary scoping searches may be necessary to discover suitable criteria. A wide range of elements might serve as criteria for either including or excluding something. The use of exclusion and inclusion criteria enhances the focus of research and adds credibility to the research topic. This paper incorporated the following factors to assess the particular prerequisites for the inclusion and exclusion criteria (Figure 2).

Table 2: Inclusion and Exclusion Criteria	
Inclusion	**Exclusion**
Included QA practices and/or adopted	Studies that do not present QA practices and/or adopted
Should be written in English and published between 2020 and 2024	Studies that are not written in English
Should be published between 2020 and 2024	Studies that were not published between 2020 and 2024
Should involve QA in online teaching and learning in the 4IR	QA studies that do not include students and lecturers
Source: Generated by Authors Based on Literature Review.	

2.3. Quality Assessment

Evaluating the credibility of the evidence presented in a systematic review, it as crucial to analyse the data it contains. Biases stemming from the research process might distort the results of a poorly done study, thereby necessitating cautious interpretation. The quality assessment of the included papers was conducted using Endnote. The five criteria used to assess the quality includes; (i) presentation of inclusion/exclusion criteria, (ii) adequacy of the search, (iii) assessment of the quality of included research, (iv) presence of sufficient details regarding individual included studies, and (v) synthesis of the included studies. The categorization of "included," "undecided," and "excluded" was achieved using Endnote for interpretation. The endnote tool has been utilised in several systematic review studies. The Table 3 illustrates the quality assessment of articles.

Table 3: Quality Assessment	
Data Extraction Items	**Description**
Title	Title of paper
Authors	List of all the authors involved in the study
Publication date	The publication date of the research paper (ranging from 2020 to 2024)
Type	The type of publication (journal articles)
Country of Publication	
Methodology	

2.4. Data Coding and Analysis

Qualitative data coding and analysis entails the process of observing and comprehending the statements, writings, or actions of participants. Data analysis in this paper involved examining developing categories and deducing emergent themes and trends. Coding is the fundamental component in qualitative data processing and coding enables qualitative researchers to not only change but also surpass the data. Furthermore, it also plays a crucial role in bridging the gap between data collection and interpreting the significance of the data. Coding tools are specifically tailored for a particular study synthesis and encompass the interventions, outcome variables, and other data usually found in the relevant literature. In order to create a coding system that can effectively capture all essential information, researchers possessed a comprehensive understanding of the literature they plan to synthesise. Typically, coded data may be classified into four fundamental categories: The four key components of the study include: (a) the methodology and content of the investigation, (b) the level of quality of the study, (c) the details of the intervention being studied, and (d) the measurements used to assess the outcomes of the study. Key factors that have been recognised in the literature as crucial variables to include in all research syntheses are methodological and substantive features. These include the source of the study, year of publication, type of research design, and characteristics of the authors/investigators, such as their discipline and educational credentials. The selection of intervention categories and relevant outcome measures is highly dependent on the individual study and is guided by well-defined research objectives. Additionally, these choices are influenced by pertinent quality assurance concerns in order to maximise their effectiveness in the context of online teaching and learning.

2.5. Ethical Consideration

A key component of the study's ethical considerations is the scrupulous and thoughtful utilisation of previously published sources and data. To uphold academic integrity and reduce the risk of plagiarism, the research diligently acknowledges and attributes all external sources of material. There are less ethical concerns about data collecting and research engagement in this study since the data utilised is publicly accessible and does not need the participation of individuals.

3. Results

Upon completing a thorough analysis of the literature, it was determined that all three databases produced a combined total of 19 academic papers related to the subject of quality assurance techniques in higher education in the Fourth Industrial Revolution. Table 4 presents the data about articles, including the author's name, article title, publication year, and country of origin. The table illustrates a significant surge in the number of publications in the year 2022, with a significant number of articles being published in SA.

Table 4: Selected Publications

Author/s	Year of Publication	Title	Country of Origin
P. Akpan-Obong	2023	Covid-19 and African e-learning systems: structural and institutional strategies for resilience and antifragility	Nigeria
R. Aluko, G. Krull and E. Mhlanga	2022	Shaping open, distance and e-learning in post school education and training: A call for a revised agenda	South Africa
O. Arek-Bawa and S. Reddy	2022	Digital Curricular Transformation and Fourth Industrial Revolution 4.0 (4IR): Deepening Divides or Building Bridges	South Africa
M. Dzingirai, P. Kandufa and F.Y. Sebele-Mpofu	2022	E-learning implementation challenges in universities during COVID-19 pandemic	Zimbabwe

Table 4 (Cont.)

Author/s	Year of Publication	Title	Country of Origin
O. S. Madumo and J.R. Kimaro	2021	Accelerating the Fourth Industrial Revolution in higher education realities and lessons from universities in Kenya, Zambia and South Africa during the COVID-19 pandemic	Kenya, Zambia, and South Africa
M. Mashilo and M. Selelo	2021	The impact of covid-19 on the quality of education in institution of higher learning: An exploratory study in the University of Limpopo	South Africa
L. Mavuru and K. Pila	2023	A systematic review of science teachers' and lecturers' beliefs and perceptions about the transition to online teaching in Southern Africa	South Africa
C. Miles	2021	Facilitating pedagogical change in online learning in higher education through professional development	United Kingdom
S. Mohale Ernest and M. Madumetsa Godfrey	2022	Coining Online Teaching and Learning in Higher Education: Reference to COVID-19 Pandemic in South Africa	South Africa
A. C. Mpofu, F. Y. Mpofu, F. Mantula and S. Ndlovu	2024	The Essentials or Fundamentals for Harnessing Technologies to Improve Teaching and Learning through Online Learning as Part of Digital Transformation in Higher Education	Zimbabwe
S. Nakaziba, S. Kaddu, M. Namuguzi and A. Mwanzu	2023	Exploring experiences regarding information literacy competencies among nursing students at Aga Khan University, Uganda	Uganda
C. Ndebele and M. Mbodila	2022	Examining Technology Acceptance in Learning and Teaching at a Historically Disadvantaged University in South Africa through the Technology Acceptance Model	South Africa
C.A. Petersen	2023	Experiences of nurse educators at a college campus in the Western Cape regarding their transition to online teaching during the covid-19 pandemic	South Africa
M. E. Selelo and M. G. Manamela	2022	Coining Online Teaching and Learning in Higher Education: Reference to COVID-19 Pandemic in South Africa	South Africa
P. T. Sibiya	2024	Incorporating digital scholarship content in South African library and information science schools	South Africa
G. van den Berg	2022	The Role of Partnerships in Preparing Open Distance E-Learning in South Africa for the 4IR: A Case Study	South Africa
V. Voronkova, G. Vasyl'chuk, V. Nikitenko, Y. Kaganov and N. Metelenko	2023	Transformation of digital education in the era of the fourth industrial revolution and globalization	Ukraine

Figure 2: Publications per Year

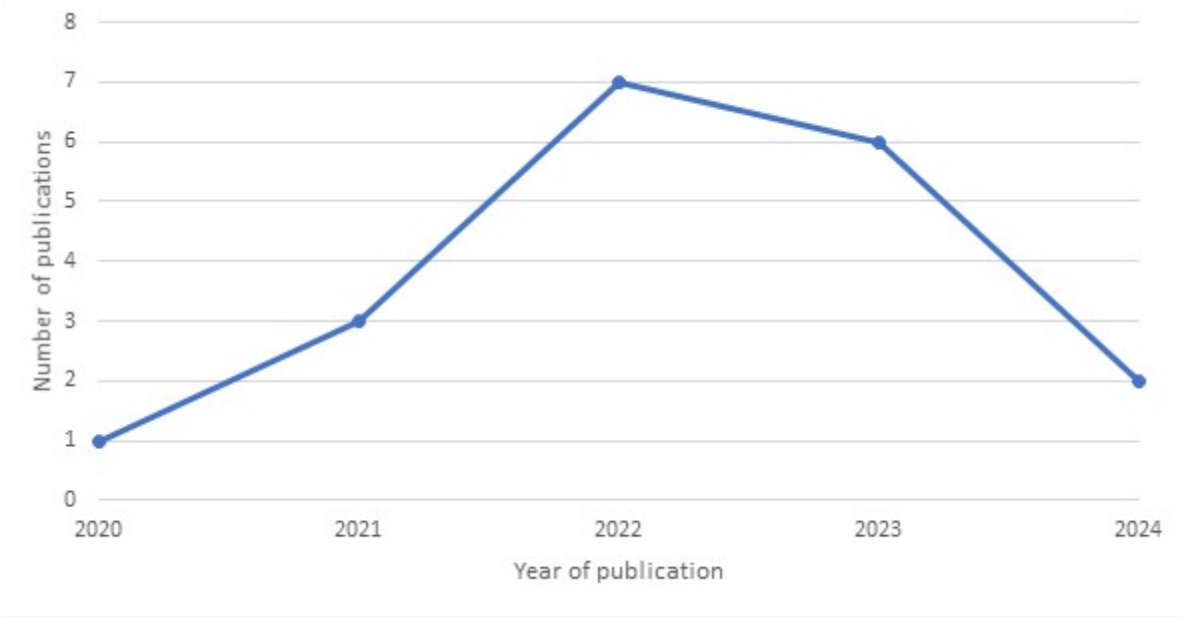

Table 5: Thematic Analysis of Literature

Themes	Articles	Number of Articles
Policy frameworks for online teaching and learning	P. Akpan-Obong (2023); V. Voronkova, G. Vasyl'chuk, V. Nikitenko, Y. Kaganov and N. Metelenko (2023)	2
Online assessment integrity	R. Aluko, G. Krull and E. Mhlanga (2022); O.S. Madumo and J.R. Kimaro (2021); M. Mashilo and M. Selelo (2021)	3
Building innovative pedagogy	V. Voronkova, G. Vasyl'chuk, V. Nikitenko, Y. Kaganov and N. Metelenko (2023); C. Miles (2021); S. Nakaziba, S. Kaddu, M. Namuguzi and A. Mwanzu (2023)	3
The digital transformation and manipulation of digital information	M. Dzingirai, P. Kandufa and F.Y. Sebele-Mpofu (2022); A.C. Mpofu, F.Y. Mpofu, F. Mantula and S. Ndlovu (2023); S. Mohale Ernest and M. Madumetsa Godfrey (2022)	3
The digitised curriculum that enables the acquisition of digital quality.	O. Arek-Bawa and S. Reddy (2022); L. Mavuru and K. Pila (2023)	2

Source: Authors

3.1. Online Assessment and Integrity

Assessment is a crucial component of the educational process. The four objectives of assessment are diagnostic, formative, summative, and quality assurance. Unlike just marking and certifying learning, and recognising and validating abilities and competencies, it allows for the gathering of pertinent data on learner performance (Aluko *et al*., 2022). In this context, the advent of technology has brought forth new methods of communication and altered social relationships. These changes are significant as they include a wider range of forms, modes, and frequency. Consequently, they have an impact on education practices and systems. Contemporarily, there are various challenges that are cited by various scholars and they affect the overall integrity of online teaching and learning (Madumo and Kimaro, 2021). These problems are exacerbated by the fact that these assessments have to be carried out remotely, highlighting exceptional difficulties for HEIs, including academic dishonesty such as plagiarism, copy and paste without acknowledging sources.

Although academics may have encountered difficulties in transitioning to online assessment techniques, it is important to note that many traditional institutions had not previously employed any type of online assessment at an institutional level (Mashilo and Selelo, 2021). Which has resulted in the probability of engaging in cheating behaviour becoming common amongst students and is influenced by factors such as individual cognitive abilities, social influence from peers, comparing oneself to others, the structure of classroom goals, personal aptitude and effort, the effectiveness of teachers' instructional pedagogies, grading criteria, personal moral values, the presence of surveillance, adherence to honour codes, instances of peers avoiding detection, and the implementation of fair testing procedures. Previous studies indicate that students tend to get greater scores in online tests as opposed to face-to-face exams. It is plausible that the disparity in grades might be attributed to the prevalence of cheating in online exams.

3.2. Building innovative pedagogy

Researchers assert that in order to improve the quality of higher education in the current era of the Fourth Industrial Revolution (4IR), it is crucial to have a comprehensive understanding of the technical aspects of online teaching (Voronkova, Vasyl'chuk, Nikitenko, Kaganov and Metelenko, 2023). This understanding should be shared by all stakeholders involved in university education, including students, as well as academic and non-teaching staff. The method of assuring the quality of online pedagogy is equivalent to that of conventional face-to-face teaching (Miles, 2021). Therefore, the standard quality assurance procedures in higher education still apply. Nevertheless are some challenges that develop due to quality assurance processes in online learning, particularly in terms of engagement. This is because certain students may have network-related difficulties that hinder their effectiveness in participating in the teaching and learning process (Nakaziba *et al.*, 2023). During the analysis of student engagement and retention in the class, it is emphasised that lecturers should effectively demonstrate pedagogical principles. This includes providing unambiguous instructions for active learning and teaching methods, utilising active formative and summative feedback, and incorporating in-class activities that promote employability. By doing so, the success of online delivery is ensured.

3.3. Policy frameworks for quality assurance in online teaching and learning

Clear and harmonised university quality assurance policies are necessary to govern online and hybrid teaching in a certain institutions. These regulations are expected to align with a national quality assurance framework for service delivery (Akpan-Obong, 2023). As a result, the Council for Higher Education (CHE) acknowledged that quality improvement and quality enhancement are most effectively accomplished when they are led by institutions, necessitating institutions to have more self-regulation over the quality of their fundamental activities of learning and teaching amongst others. Through this, HEIs are encouraged to develop coherent online and blended learning strategies that make use of advancements in information communication technology (ICT). Since 2020, it has become even more imperative to consider factors such as students' devices and data packages, the demands of the institution's learner management system, and the conditions in which students are studying (Voronkova *et al.*, 2023). Additionally, the crucial aspect is to train academic and support staff to update the curriculum, engage with new teaching methods, and utilise technology effectively. Another often mentioned obstacle is the adoption of standards and indicators by organisations and certification agencies that were originally designed for traditional institutions and are not suitable for online teaching and learning.

3.4. The digital transformation and manipulation of digital information

Similar to previous revolutions, it is imperative to acknowledge the need for the "elimination, relinquishment" of outdated, regressive systems in order to establish new, fundamental ones that adhere to the principles of progress and advancement. In order to ensure the success of this revolution and avoid lagging behind, governments must undertake the process of digital transformation in line with the advancements of train 4.0. Digital transformation will revolutionise the globe, but, it does not imply a lack of control or meddling in the process (Dzingirai *et al*., 2022) Historical evidence has shown that nations that excel in the implementation and advancement of emerging technology consistently achieve greater prosperity and development. The digital transformation path encompasses a diverse range of operations, transactions, relationships, technology advancements, developments, external and internal influences, and several other aspects (Mpofu *et al.*, 2023). Therefore, it is a multifaceted endeavour. The primary objective of Quality Assurance in digital transformation is to provide utmost importance to user experience while simultaneously ensuring the application's information security (Mohale and Madumetsa, 2022). And often there are challenges perpetuated by the lack of security which compromises the current practices in online teaching and learning. Another imperative component is the absence of training for personnel in external and internal quality assurance standards and indicators is a significant obstacle in cultivating cultures of quality.

3.5. The Digitised Curriculum that Enables the Acquisition of Digital Quality

The process of curriculum development may be categorised as either narrow, focusing on the creation of a specific curricular output, or wide, including a long-term and continuous process of curriculum improvement (Arek-Bawa and Reddy, 2022). The broad approach generally involves other areas of educational transformation, such as teacher education, curriculum development, and assessments. Curriculum development is crucial for enhancing the skills and knowledge of academics and curriculum developers in this area. The curriculum designed for conventional in-person instruction must be reassessed and adapted for online instruction. In order for online technology to be effectively incorporated into teaching and learning, academics must possess three fundamental crucial digital skills: technical proficiency, curricular expertise, and pedagogical knowledge (Mavuru and Pila, 2023). When creating digitised curriculum, online learning platforms, and software, it is necessary to make certain assumptions about the interests, prior knowledge, and viewpoints of the users. This gives rise to an implicit curriculum that may impede the learning process for various student populations who do not conform to these expectations.

4. Discussion

Quality assurance in online teaching and learning has become an important component for HEIs. The conventional method of in-person learning was combined with online learning, and different strategies were used to facilitate the transition process. Nevertheless, it has not been without of problems. The findings revealed many concerns pertaining to academic integrity and the challenges associated with maintaining honesty in online teaching and learning. The online platforms were determined to be faulty due to students' lack of integrity, particularly when writing exams. Academics have emphasised that pupils tend to get better scores in online examinations, which is a cause for worry and underscores the need for thorough evaluation of the quality assurance process. Aluko *et al*. (2022) argue that the issue of academic integrity is a cause for concern since companies also prioritise the quality of graduates they recruit, which directly impacts the reputation of the HEI. Necessitating HEIs to thoroughly evaluate the current practices that assist in ensuring quality. This study findings suggests that quality assurance (QA) is an essential component for improving academic integrity, which in turn enhances the quality of learning. The study findings suggest that policy frameworks are crucial in ensuring quality assurance by offering rules for online teaching and learning. Recently, policy frameworks in higher education in South Africa have been modified to include provisions for online teaching and learning by the CHE. The implementation of these modifications is carried out at the institutional level. subsequently, the regulations require further examination since students have other means of interaction, particularly while completing assessments.

When scheduling lessons, it is crucial to carefully analyse the pedagogy of learning theories that we may use in conjunction with the technology chosen. Pedagogy is the academic discipline that examines the techniques and strategies used in teaching and learning, including the objectives of education and the means by which these objectives might be accomplished. Effective teaching and learning includes engaging and participatory, using the advantages of hands-on learning in a purposeful and applicable way. This approach fosters comprehension, develops ideas, reinforces information, and expands learning to novel encounters. The availability of the information on the online platforms used offers an opportunity for students to have information at their disposal however it takes away the human element.

5. Conclusions and Recommendations

Quality assurance methods necessitate higher education institutions to allocate resources towards their technological facilities in order to achieve a certain degree of development. This is of great importance for both lecturers and students at all levels. Consequently, Higher Education Institutions (HEIs) cannot act alone, but rather, they must collaborate and synchronise their efforts with other sectors, such as the government. It may provide a considerable problem due to their familiarity with the operation and ability to act autonomously. Implementing quality assurance procedures in higher education institutions (HEIs) is anticipated to enhance the efficiency of online teaching and learning. However, let's consider a scenario where the challenge of technical infrastructure, equipment, and technological solutions remains unresolved. Therefore, if this problem is not resolved, the process of revolutionising education will not be successful, and the use of digital technology in teaching and learning might have disastrous consequences for both educators and students. The dangers include potential aberrant learning behaviour, unrestricted educational activities, and compromised educational quality.

The absence of quality assurance standards in the expansive virtual realm might pose a significant risk. The digitization of education is often believed to promote 'digital equality' by providing unrestricted access to technology, regardless of time and location constraints. However, this might exacerbate the deficiency in the quality of teaching and learning. Students from underprivileged backgrounds who lack the necessary equipment or are unable to pay the expenses

associated with telecommunications services will also face the danger of falling behind. Ultimately, digital transformation enables the establishment of expansive online forums that foster the growth of professional learning communities for both instructors and students. Additionally, there exists a plethora of technologies that aid educators in crafting instructional materials and constructing classes. It is often regarded as a very advantageous chance for professional career advancement for instructors. However, these electronic tools also facilitate the effortless duplication of data, lesson plans, publications, and even learners' evaluations and comments. The primary obstacle in digital transformation is in guaranteeing the practicality of learning, teaching, and educational activities.

This section offers a thorough collection of suggestions derived from the latest research. These recommendations may be used to provide quality control in the context of online teaching and learning in the Fourth Industrial Revolution (4IR). Nevertheless, not all suggestions are appropriate for every teaching and learning online. Therefore, it is crucial to exercise vigilance while developing educational tools that are tailored to the requirements of online platforms. The first set of suggestions aims to reduce or, ideally, eradicate instances of academic dishonesty by providing clear and efficient communication channels between instructors and students in online teaching and learning. The students must be promptly and effectively notified of institutional regulations pertaining to quality assurance and online learning in a clear and straightforward manner. Instead of referring students to the institutional policy, it is necessary to ensure that students have a clear understanding of what actions are considered a breach of academic integrity. Due to the limited contact between academic staff and students in online education, it becomes challenging to accurately assess a student's actual performance. This situation creates an opportunity for students to imitate excellent performance without really reaching the desired learning goals. The second set of guidelines is to identify discrepancies among various teaching and learning approaches.

Conflict of Interest

There is no conflict of interest.

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