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Harnessing AI for EFL Educational Advancement: A Reflection on Policy, Practice, and Pedagogy within the Ministry of Education in the UAE

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ABSTRACT

This research examines the integration of Artificial Intelligence (AI) within the English as a Foreign Language (EFL) educational sector in the United Arab Emirates (UAE), focusing on policy implementation, pedagogical implications, and practical applications. As AI rapidly transforms educational methodologies through personalized learning experiences and increased accessibility, this study investigates its long-term impact on education equity, the evolving roles of educators, and curriculum alignment with the demands of future job markets. The data collection method involved semi-structured interviews with 67 employees from the Ministry of Education, conducted in collaboration with Alef Education. The participants, all of whom are educators, include school principals and other key stakeholders. This qualitative research approach provided valuable insights into the real-world application of AI in EFL education, highlighting both opportunities and challenges. Findings suggest that AI holds significant potential to enhance learning outcomes, bridge educational gaps, and support diverse student needs. However, challenges remain, including ethical concerns, teacher preparedness, and the necessity for clear policy frameworks to regulate AI integration. The study emphasizes the importance of balancing AI-driven advancements with responsible and ethical implementation. It concludes with policy recommendations aimed at optimizing AI's role in education while ensuring inclusivity, equity, and sustainability. These insights contribute to a

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broader discussion on the future of AI in EFL education and its implications for shaping educational strategies that meet the needs of an evolving society.

Keywords: Artificial Intelligence (AI); EFL Education; UAE Education Policy; Pedagogy; Personalized Learning; Education Equity; Curriculum Alignment; Ethical AI Implementation

1. Introduction

AI is fast emerging as an integral element of all human pursuits and similarly, it holds tremendous potential for implementation in the education sector. The greatest benefits of using AI in the education sector include enhancement in accessibility, better quality of the learning experience, and updated course content. The application of AI tools also allows students to harness their creative potential to the fullest[1]. This happens when the learning environments involve fun, collaboration, and better engagement. Along with the increase in the use of artificial intelligence in the education sector, extensive research has also been conducted on its implications[2]. The application of AI technology in the realm of education brings about a radical transformation in pedagogical methods based on personalised learning. This involves individualised attention to the needs of all students based on better tracking of the student's progress and requirements. Despite all the benefits of using artificial intelligence in education, such application of the technology raises several concerns related to ethics and security. Apart from that the benefits should also reach students belonging to all backgrounds and regions of the world. Effective policies must also be formulated to ensure the effective implementation of AI in education as well as address the issues of equitable access, ethics and data security. International policy-making on AI highlights the universal benefits of using it in the education sector. However, the replication and scaling up of AI at the local level requires an understanding of the local contexts[3]. Most students in the UAE are not native speakers of the English language Furthermore, there is a large number of students learning English as a foreign language in the UAE. Pedagogical tools based on artificial intelligence can be especially useful for such students in the UAE. Artificial intelligence can be effectively used by students in the UAE to overcome their basic challenges in learning English. Additionally, it can also help them use the English language creatively from the perspective of literary flair. Nevertheless, the use of Generative AI tools depends on English prompts. Hence, students from other cultures may struggle to phrase relevant prompts while chatting with Generative AI tools. From the perspective of the English language, this is the main challenge in using AI for students in the UAE.

1.1. Rationale and Research Aim

In recent years the use of artificial intelligence technology has expanded to various sectors and industries across the world. While there are several benefits of using AI tools, such technology also poses significant challenges. Here lies the importance of effective policies and strategies guiding the use of artificial intelligence technology. This is quite applicable to the education sector also where AI-driven technologies are making fast inroads. This research seeks to explore the aspects of policy, practice, and pedagogy concerning the application of AI in the education sector of the UAE. The findings of this research will not only contribute to the existing body of knowledge on pedagogical methods but also offer key insights into educational policies and the development of AI. The application of such methods and policies must also be directed at the students learning English as a foreign language in the UAE.

1.2. Research Questions

i. What are the long-term impacts of AI on the structure, delivery, and accessibility of education, particularly in addressing educational inequalities?
ii. How does the integration of AI influence the roles and effectiveness of educators in personalising learning and assessing student outcomes?
iii. What policies and ethical frameworks are necessary to ensure the equitable, secure, and effective implementation of AI in educational systems?
iv. How can AI be leveraged to continuously update educational content and curricula to align with future job market demands and foster critical thinking in students?

1.3. Theoretical Framework

The application of artificial intelligence in the teaching of different disciplines including EFL can lead to adaptive learning environments involving the application of personalised, flexible, inclusive, and engaging AI tools[4]. In this way, artificial intelligence can make considerable value addition to educational qualifications, as well as continuous learning. AI tools use information from different sources across the globe and rely on algorithms to analyse such information. The data on different phenomena and developments in the world can be presented in the form of pedagogical, domain, and learner models. These educational models can also help AI tools in providing personalised feedback to students[5]. The theoretical framework of this research is primarily based on various models of learning.

While the pedagogical model focuses on teaching methods, the domain model concerns the knowledge shared with the students. Similarly, the learner model primarily emphasises the role of the student in the process of learning. The integration of the teaching methods, course content, and interests of the students can significantly contribute towards the personalisation of learning. Personalised feedback depends on the close supervision of students in terms of their behaviour, strengths, weaknesses, problems, and progress. This is where the various AI technologies can perform far better than human interventions. Such an application of artificial intelligence in the education sector is also referred to as intelligent tutoring.

2. Literature Review

2.1. Impact of AI on Accessibility, Equality and Other Aspects of Sustainable Education

The concept of personalised learning can be directly related to the delivery and accessibility of education. The objective of personalised learning has been an integral part of the vision for transforming the education sector using artificial intelligence technology. Since the initial resistance to the use of AI in the education sector, the global education sector has started to show interest in the potential of AI to transform education. The growing interest and decreasing resistance to AI can be attributed to the experiments with different models of applying artificial intelligence in the delivery of education[3]. AI is commonly associated with analysis and research driven by its application in the form of learning analytics and data mining. However, artificial intelligence also has the potential to address the issues of equity, accessibility, structure, and quality in the delivery of education. The concerns of equity, inclusion, quality, and life-long learning are addressed by the 4th sustainable development goal in the United Nations Agenda for Sustainable Development adopted in 2015[6–8]. This implies that artificial intelligence can potentially play a larger role by promoting sustainability in the education sector. **Figure 1** below shows how a large number of students and teachers from various schools and universities participate in sustainability initiatives focused on the natural environment[9]. **Figure 1** depicts how the participation of schools in sustainability initiatives is much more that of universities. Schools in the UAE also collaborate with communities in green initiatives. Such participation can also be mobilised in the direction of initiatives aimed at enhancing equitable access to education including the use of AI. However, it requires more support from the institutions of higher learning.

AI is already being used in the delivery of education to disadvantaged and marginalised communities including people with disabilities, refugees, isolated groups, and individuals with meagre financial resources[10]. For instance, the use of telepresence robotics to educate children with chronic illnesses or special needs is becoming popular across the world[10–12]. Such technology powered by artificial intelligence is also used to support students complete their education during contingencies or crises[12]. The use of artificial intelligence also allows educationists, teachers, policymakers, and administrators to tailor the structure and delivery of education to the specific needs of students. This is the essence of personalised learning based on the application of artificial intelligence. Proficiency in English can further increase the accessibility of education for students in the UAE. This explains the importance of using artificial intelligence in education from the perspective of English as a foreign language.

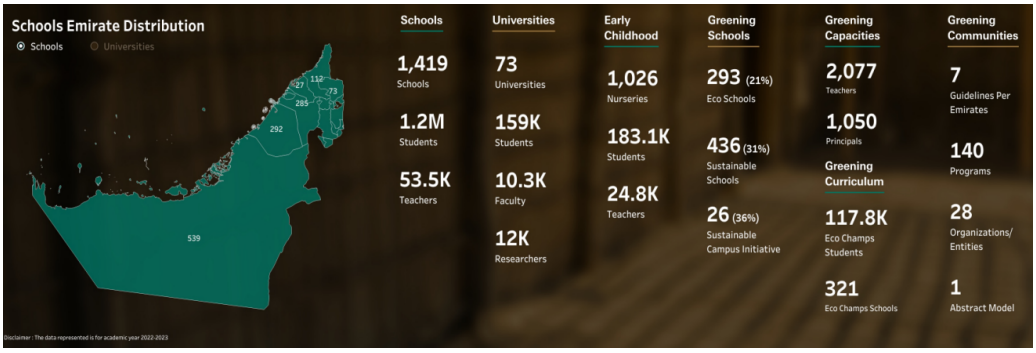

Figure 1. Green initiatives in the education sector of the UAE.

Source: [9].

2.2. Benefits and Challenges of AI in Education

Universities and other educational institutions across the world are looking to harness the potential of artificial intelligence to transform research capabilities, pedagogical practices, and administrative processes. Nevertheless, the integration of AI in the education sector presents a mix of challenges and opportunities that must be addressed using foresight and thoughtful consideration [13]. The delivery of personalised learning discussed earlier depends on pedagogical innovation. Such innovation aims to address the individual learning styles, aptitudes, strengths, weaknesses, and preferences of different types of students. Artificial intelligence can significantly enhance the overall learning experience by addressing these aspects of personalised learning [13]. The application of AI in teaching has already initiated a paradigm shift by changing the nature of institutional support provided to students in the various institutions of higher learning. Apart from personalised and instant support through virtual assistants, AI also facilitates communication between the faculty and students. AI-driven automation of routine processes such as grading, scheduling, and data administration allows teachers and administrative staff to give attention to a larger number of students [14]. Chatbots and virtual assistants have improved the quality and delivery of student support services by offering round-the-clock assistance in areas such as course enrolment and career counselling. Learning analytics based on artificial intelligence are changing the conventional approaches to curriculum design based on accurate analysis of learning behaviours. This has the potential to transform pedagogical policies and practices across the globe.

However, the challenges concerning faculty and staff readiness, implementation costs, technological difficulties as well as legal concerns pose serious obstacles to the adoption of artificial intelligence in education [14]. Many teachers and non-academic staff find it difficult to adapt themselves to the integration of AI. Furthermore, the high costs and operational difficulties associated with AI also raise serious concerns. In addition, the issues concerning data security, privacy, transparency, accountability, and academic integrity pose legal and ethical challenges to using AI in the education sector. Weakness in the English language can also be considered a challenge in using AI for students in the UAE.

2.3. Enhancements in the Learning Experience

Artificial intelligence has changed the face of learning through more personalisation engagement and efficiency in learning and teaching methods. AI technologies such as machine learning and natural language processing have significantly enhanced the learning experience. Algorithms used in artificial intelligence allow educators to identify patterns by analysing data to make predictions which play a key role in improving the quality of the learning experience [15]. Personalised learning allows students to complete their courses at their own pace following individual learning styles resulting in better educational outcomes. Data analysis based on AI not only improves the quality of decision-making in education but also enhances the level of engagement through constructive feedback and more interactions.

Robots, computers, and other equipment supported by artificial intelligence have proven their effectiveness in improving the learning experience of students from childhood education to higher education [16]. Adaptive web-based education systems driven by AI can also play a significant role in

enhancing the learning experience provided both instructors and learners can make the necessary adjustments. However, this emerges as one of the common challenges due to a lack of readiness on the part of teachers as well as students. Such challenges are associated with technological skills and adaptability discussed earlier. Hence, it is imperative to deal with the problems and difficulties in the adoption of AI in academics.

The most important aspects of education based on artificial intelligence include innovative virtual learning, data analysis, and forecasting. The application of AI in education has led to the emergence of some futuristic scenarios including smart schools, which also offer remote education based on online learning[17]. Students enrolled in such smart schools use different types of devices, including laptops, tablets, and smartphones to leverage the potential of virtual, personalised assistants, edge computing, real-time analysis, and similar applications of information technology. Disruptive technologies such as data mining, learning analytics, intelligent education systems, and machine learning have significantly facilitated the introduction of innovative educational models. The overall impact of AI in the education sector includes an enhancement in the efficiency and effectiveness of instructional as well as administrative tasks.

2.4. Innovation in Learning through the Adoption of Artificial Intelligence

Apart from intelligent tutoring, artificial intelligence also supports smart collaboration between students, especially in the case of online learning. In smart collaboration, virtual assistants facilitate adaptive group formation, expert advice, and intelligent moderation. From the perspective of teachers and administrators, AI tools provide intelligent assistance in research, analysis, and managerial tasks[18]. Nevertheless, teachers and administrators need to overcome the digital divide to fully leverage the potential of artificial intelligence-driven technologies. Hence, governments, educators, policymakers, and other stakeholders must collaboratively work in the direction of providing training and resources to address the digital divide. The advent of Industry 4.0 has unleashed several disruptive innovations requiring the development and acquisition of advanced technological skills. The lack of such skills leads to skill obsolescence which poses significant threats of loss of employment and job displacement. These facts highlight the importance of skill upgradation where artificial intelligence can play a very important role. This is possible due to the superiority of AI tools in facilitating collaboration, communication, problem-solving, and critical thinking. Furthermore, online search driven by artificial intelligence provides access to vast repositories of knowledge and skills within a very short time. Thus, learners can acquire advanced skills and the latest knowledge quite efficiently using assistance from artificial intelligence.

Existing research highlights chatbots, expert systems, intelligent tutoring, machine learning, personalised learning tools, and visualisation tools as the most significant applications of AI in the education sector[4]. Stimulating conversations with students represents one of the most advantageous aspects of chatbots in the education sector. Such engagement not only increases a student's interest in learning but also helps in overcoming fatigue and focusing on the learning materials. From the administrative point of view, expert systems such as learning management systems assist in pedagogical planning and enhance managerial efficiency. This is possible due to the improvements in collaboration, communication, and coordination brought about by the adoption of AI in learning environments.

Many students across the world, especially in distance education face problems associated with delays in the delivery of learning materials and the absence of timely feedback or assistance. Furthermore, needs, preferences problems, and learning styles significantly vary from student to student. These issues can only be solved by customised learning solutions. Intelligent tutoring systems not only facilitate the timely delivery of learning materials but also provide timely feedback and educational assistance. In addition, such systems also offer personalised learning assistance to address the requirements, choices, and weaknesses of individual students. Predictive analytics and data mining supported by machine learning allows administrators and educators to analyse voluminous data on the progress and performance of students. Thus, analysis based on the use of machine learning helps in making accurate and relevant predictions required for adaptive as well as preventing interventions. This implies that the use of artificial intelligence in the education sector can prevent different types of crises and facilitate innovation based on a proactive approach. Personalised learning based on AI tools helps students at the two levels of interac-

tive educational assistance and learning resources tailored to individual requirements. Virtual learning environments supported by artificial intelligence facilitate immersive learning based on better collaboration, communication, feedback, and visualisation of data[19]. Such learning environments can be further enhanced through the effective use of technologies based on augmented reality and virtual reality.

2.5. Policy Framework for the Implementation of AI in Educational Systems

Policymaking is one of the most important factors determining the success of artificial intelligence technologies in the education sector[20]. Governments, administrative bodies, and educational institutions must consider the interests of teachers, non-academic staff as well as students while making policies on the adoption of artificial intelligence in the education sector. Without effective policies, it will not be possible to realise the objectives of using AI-based solutions in the education sector[20]. Furthermore, effective policies provide guidelines for leveraging the advantages of AI and overcoming the challenges associated with its integration in education. With the increasing accessibility of generative AI tools, they are increasingly being used in different areas and sectors including education. This makes it imperative for universities to develop effective, and comprehensive policies to ensure students are benefitted from AI tools based on an understanding of the technology. With the increasing use of AI technology in areas such as finance, healthcare, and transportation, students must understand the nuances of the technology. A holistic education policy focused on artificial intelligence would seek to equip students with the knowledge and skills required to work with AI in professional roles. This will also prepare the students for the future. AI has the potential to bring about a paradigm shift in society, especially in education. Through effective policymaking, institutions of higher learning can foster the active participation of students in the development of AI tools. Policymaking also includes guidelines which can help students make ethical use of artificial intelligence without compromising academic integrity.

Educational policies formulated till now fail to adequately deal with the latest advancements in text-based GPT 3.5 and 4. The potential advantages and concerns associated with the use of such technology in education necessitate guidelines for its responsible use. The responsible and balanced use of AI technologies concerns ethical questions dealing with the acceptability of artificial intelligence in education. "The guidelines for the ethical application of AI, focus on the core principles of beneficence, non-maleficence, independence, fairness and explicability[21]." The application of these principles also requires an educational policy which comprehensively deals with ethical questions. The governance policies for artificial intelligence in Singapore also uphold the ethical dimensions of using AI in decision-making and delivering human-centric solutions.

2.6. Alignment of AI with the Future Job Market Demands

AI technologies are being widely used in the management and delivery of education. Nevertheless, such usage is evident more in administrative functions through management information systems. Big data and data mining technologies have compelled policy-makers to rethink the delivery of education. The use of AI technologies among students attracts researchers, developers and educators to this area. **Figure 2** provided below indicates that 1,26,000 students were pursuing graduation education in the period from 2022 to 2023. Similarly, 66% of faculty and 61% of researchers with doctorate degrees are also shown for the same period[9]. These statistics from the Ministry of Education in the UAE show the vast size of the student community in the UAE as well as the large number of faculties and researchers with PhD[9]. All these students, teachers and researchers can immensely benefit in education as well as research by using various applications of artificial intelligence.

The advanced applications of AI, are also described in terms of a 'fourth education revolution', providing high-quality, personalised, and lifelong learning solutions[22]. Adaptive and continuous assessment based on artificial intelligence has the potential to significantly reform administrative processes in education for the better. However, it is important to recognise the concerns regarding pedagogical innovation driven by AI and its potential impact on teachers, administrative staff and students. Furthermore, the importance of the English language for employability must also be considered in this context.

Figure 2. Educational backgrounds of students, faculties and researchers in the UAE.

Source: [9].

3. Research Methodology

3.1. Research Philosophy

This research involves several subjective and contextual factors. Furthermore, it is focused on the education sector which deals with various aspects of society. For this reason, the philosophical underpinnings of this research are based on interpretivism. The philosophy of interpretivism developed as a critique of the positivist philosophy. While interpretivism is based on recognising subjective elements and factors, positivist research emphasises objectivity and scientific rigour [23]. Subjective factors or variables in a study may include cultural, historical, linguistic, social or behavioural elements. Interpretivists also differ from positivists in terms of their perception of reality and the methods used to interpret it. Hence the epistemology and ontology of interpretivist research differ from that of positivist studies. Interpretivism is based on a subjective epistemology and relative ontology. In sharp contrast, positivism is characterised by an absolutist ontology and objective epistemology. Accordingly, interpretivists believe that the nature of reality varies according to the context and hence subjective methods should be applied to study it [23]. However, positivists believe that reality is universal and can be understood only by objective methods.

Although artificial intelligence concerns science and technology, its application in the education sector depends on cultural, societal, and behavioural factors. This study is focused on the use of artificial intelligence in the education sector of the UAE. Every country has its unique cultural, social, linguistic and historical characteristics. Hence the integration of artificial intelligence in the education sector of the UAE is likely to be influenced by such subjective factors. Apart from that, the success of AI-driven technologies in the education sector also depends on the behavioural characteristics of various stakeholders including educators, policymakers, teachers, administrative staff and students. For example, the managerial style of administrators, instructional methods of teachers, and learning preferences of students depend on individual personality and behavioural characteristics. Furthermore, the implications of using artificial intelligence in education are likely to vary across countries. Although there may be some common considerations, the differences outweigh them.

Interpretivists also give more importance to the perspectives and interpretations of the researcher [24]. However, in positivist research, there is not much scope for the incorporation of the researcher's perspective. Although positivist research is more credible and accurate, interpretivism allows a high level of flexibility required in a study involving subjective factors. While positivism is more suited to the natural sciences, most studies in the social sciences, humanities and entrepreneurship are based on interpretivism. Based on interpretivism, this study will allow the researcher to consider multiple viewpoints including his perspective along with the subjective factors. This will add a critical dimension to this research. All these facts and imperatives justify the choice of interpretivism as the foundational philosophy of this research.

3.2. Research Approach

Based on the research approach, a study can be classified as either inductive or deductive. While the inductive ap-

proach is more suitable for qualitative or exploratory research, the deductive approach is mainly applied in experimental research. Deductive research primarily involves hypothesis testing applied to assess the validity of an existing theory or generalisation. In contrast, inductive research does not require any pre-existing theory as a starting point[25]. Hence, the inductive approach offers more flexibility and freedom, as it is not constrained by any theory or generalisation. In a study based on the inductive approach, the researcher has adequate scope to collect specific data suiting his requirements from a wide range of sources. He can use such data to seek solutions to the research questions for addressing the research problem. The data collected for inductive research can be used at a later stage for developing new models or modifying existing generalisations. Furthermore, the validity of any theory or construct developed from inductive research can also be tested through deductive studies. In this way, the inductive and deductive approaches differ in terms of the direction of research. While inductive research uses specific data to arrive at generalisations, the opposite is true in the case of studies using the deductive approach[26].

This research does not aim to check the validity of any model or hypothesis. Rather its objective is to reflect on policy, practice, and pedagogy within the Ministry of Education in the UAE in the context of leveraging AI for educational advancement. This research is not concerned with any specific theory related to artificial intelligence or the delivery of education. It explores the issue of using AI in the education sector of the UAE. In this study, the researcher requires sufficient flexibility and freedom to explore different aspects of artificial intelligence as well as the content and delivery of education. The insights gained from this study may be related to the pedagogical or learning theories but the research is primarily focused on the practical aspects of AI in education. The inductive approach selected for the study will offer adequate flexibility and scope for exploration to the researcher. Furthermore, the inductive approach is also aligned with the interpretivist philosophy and qualitative design of this research.

3.3. Research Strategy

The research strategy for this study is based on qualitative methods, narrative inquiry and an exploratory design. In general parlance, qualitative indicates non-quantifiable data, which is not expressed numerically. While the findings from the interpretation of qualitative data may be less accurate or credible in comparison to quantitative data, such analysis is more subjective[27]. The subjective aspects, factors and elements associated with a phenomenon may not be quantified requiring qualitative research. The prevalence of several subjective factors including social, behavioural, and cultural elements in this study necessitate qualitative research. Apart from its subjectivity, the research also deals with the adoption of artificial intelligence in education. The researcher requires sufficient flexibility and autonomy as the research problem deals with an area yet to be fully explored. These characteristics also justify the choice of the exploratory design for this research. The qualitative data collected for this research through a semi-structured interview will also help to build a narrative on the use of artificial intelligence for educational purposes. Hence, narrative inquiry has also been considered an integral part of the research strategy for this research.

Qualitative research is multidimensional characterised by an interpretivist and naturalistic approach to its subject matter. This also explains how the interpretivist philosophy of this research is aligned with qualitative methods. In qualitative research, a phenomenon is studied in its natural setting considering the addition of multiple subjective meanings from different sources[28]. This aspect of qualitative research can be related to the subjectivity of non-quantifiable information. Case studies, reflections and interviews are some of the techniques used to collect qualitative data. This research is primarily based on the reflections of employees working in the Ministry of Education in the UAE. These reflections will be obtained in interview settings. Due to their subjective nature, the findings of qualitative research may not be generalised to all target populations or situations. As discussed earlier, subjective and contextual factors play decisive roles in the results of qualitative research. Qualitative methods provide a better understanding of the research phenomenon or problem based on an in-depth analysis and close examination.

The multiplicity of interpretations, perceptions and meanings is one of the key features of qualitative research. According to the existing literature on research methodology, qualitative research can be more closely related to interpretivist philosophy[28]. Conversely, the positivist paradigm of research is more relatable to quantitative methods. Qualita-

tive research is also more effective in developing a contextualised understanding of beliefs, motives and behaviours [29]. It involves textual data obtained from a small number of participants in the case of primary research. However, in secondary qualitative research, a wide range of secondary sources may be considered for the collection of relevant qualitative data. Qualitative analysis being essentially interpretive aligns more closely with the interpretivist paradigm of empirical studies.

Exploratory research does not seek to provide any direct solutions to an immediate problem in a specific situation. Yet, it is more suited to problems which have not received much attention from researchers and academics [29]. The application of artificial intelligence in the education sector represents one such issue where there is huge scope for further research. Although in recent years, quite a few studies have been conducted in this direction, many aspects are yet to be explored. Due to these reasons, the exploratory research design represents another essential facet of the research strategy applied in this study. Nevertheless, the outcomes of a study based on the exploratory design are far less conclusive than those of experimental research. This also indicates why the exploratory design is more suitable for a study based on the interpretivist philosophy and inductive approach. Although a researcher enjoys more autonomy and flexibility in the case of exploratory studies, he should always be prepared for changes to his findings based on new research. However exploratory research can provide richer descriptions and more insightful information.

The reflections obtained through interviews in this research will explore multiple meanings and interpretations of the participant's experiences. The technique of narrative enquiry is based on constant engagement between the researcher and participants allowing multiple meanings and perspectives to emerge [30]. In narrative inquiry, the researcher encourages the participants to provide more information about their background for a better understanding of personal experiences. In this way, the emphasis on the participants allows the researcher to build a coherent narrative based on the similarities and differences in the individual experiences of the participants. Thus, this research strategy will not only provide ample scope for the consideration of subjective factors and multiple meanings but also allow adequate flexibility.

3.4. Data Collection and Analysis

Sampling and Interview Questions

The findings of this research mainly depend on the thematic analysis of primary qualitative data collected from employees working in the Ministry of Education in the UAE. Accordingly, 67 participants were requested to respond to 20 interview questions. In this study, primary data was collected with the help of Alef Education which is a leading technology company based in Abu Dhabi. It is especially known for its involvement with K12 schools. Apart from this Alef education has also helped in the collection of statistical information from the Ministry of Education in the UAE. The technique of purposive sampling was applied to select the 67 participants involved in this research. Purposive sampling allows the researcher to select a sample according to the requirements of his study, concerning the research aim, objectives and questions. In this way, the researcher can select only those participants who have adequate knowledge, experience, or skills to answer the interview questions. For this research, experienced and knowledgeable employees from the UAE Ministry of Education were selected. The experience of the employees in working with information technology was also considered as the interview questions primarily concerned the use of AI in the education sector. The profiles and details of employees working in the Ministry of Education were obtained for the selection of the 67 participants. These details were reviewed to identify employees with the required knowledge experience and qualifications. The participants are mainly educators and some among them work as school principals.

The required permissions, data and access were obtained from the Ministry of Education without much difficulty. Ease of access and convenience represent two other advantages of the technique of purposive sampling.

The framing of the 20 interview questions has been guided by a thoughtful consideration of the research aim and questions. This has ensured that the interview questions are directly related to the adoption of artificial intelligence in the education sector of the UAE with a focus on policy, practice and pedagogy. The interview questions are also based on the theoretical framework developed from the models, theories and concepts discussed in this research paper. A semi-structured interview is one of the most popular instru-

ments of data collection in qualitative research. The main objectives of semi-structured interviews include the sharing of experiences based on the interactions between the interviewer and the respondents. Considering these factors, the interview questions have been framed in a way which allows the respondents to freely express themselves and share individual perspectives. This is also aligned with the subjective elements and factors involved in this research.

3.5. Thematic Analysis

There are six stages in the research technique of thematic analysis: familiarisation, coding, theme development, theme definition, review, and narration. In the first stage, the researcher carefully goes through the qualitative data to familiarise himself thoroughly Thereafter tags, labels, or colouring are used to identify codes from the data set based on recurring ideas or facts. These codes are then grouped to develop themes related to the research objectives and literature review. The themes are then defined as per the requirements of a study to add meaning to them. After defining the themes, they are reviewed to assess the extent to which they are aligned with the research objectives or research questions. The final step in the process of thematic analysis involves an elaboration of the defined themes to develop the narrative of the research findings. This is also aligned with the spirit of narrative inquiry representing a key element of the research strategy. The inferences drawn from the narrative of this research will also be compared with the literature review to ensure that the results are based on critical thinking.

3.6. Ethical Considerations

The ethical foundations of this research are based on the principles of informed consent, anonymity, and academic integrity. Furthermore, adequate measures have also been taken to ensure data security and privacy concerning primary data collected from the employees working in the Ministry of Education in the UAE. Informed consent refers to the willingness to participate in a study based on an awareness of the research process and the implications of participation. Accordingly, adequate information on the research and implications of participation will be provided to the participants. Similarly, anonymity concerns non-disclosure of the identity of the participants. In this research also the identities of all the participants will be kept confidential and numbers will be used to refer to a participant while discussing their reflections.

All the sources of secondary data used in this research will be duly acknowledged using accurate in-text citations and a correct referencing format. The lack of acknowledgement of sources results in plagiarism which is one of the biggest challenges to academic integrity. Referencing is widely considered one of the best solutions to avoid plagiarism and uphold academic integrity. Furthermore, the findings from data analysis will be presented without any manipulation misinterpretation, or misrepresentation. In a study based on the interpretivist philosophy, narrative inquiry, and exploratory design, there is considerable scope for the researcher to incorporate his perspectives while interpreting the research findings. This may result in an inaccurate interpretation or representation of qualitative data. The findings from the semi-structured interviews in this research have been compared to the theories and constructs discussed initially. This not only introduces a critical perspective to this study but also enhances the accuracy and validity of the research findings. In this way, the ethical foundations of this research will ensure that the findings are credible, valid, and reliable. Apart from these factors, the use of artificial intelligence for academic purposes itself raises ethical concerns and issues. The use of AI tools can not only introduce bias in educational projects and research but it also represents a form of plagiarism. Hence the ethical dimension of adopting artificial intelligence in education must be considered while interpreting the findings of this research.

3.7. Limitations and Challenges

This research is constrained to an extent by the typical limitations of qualitative methods. The greatest disadvantage of qualitative methods lies in the non-quantifiability of data. Numerical data and its quantitative analysis provide a better and more accurate understanding of trends, patterns and the nature of a phenomenon. Furthermore, qualitative research lacks the inherent objectivity of quantitative methods and data. Qualitative data may include descriptive texts and elaborate narratives. This may increase the complexity of data analysis for the researcher. The ethical challenges of qualitative research related to the interpretation and representation of data have already been discussed in the preceding section.

The generalisability of the findings of qualitative research depends on contextual factors such as culture, society, language, region demographics and the nature of an industry or market. This research faces all these shortcomings.

4. Discussion

The readiness of teachers as well as students to adapt to the use of artificial intelligence in education represents one of the key themes of this research. Both teachers and students require updated knowledge and skills to effectively use AI tools. This explains the context of training provided by governments and educational institutions for facilitating the integration of AI in the education sector[3, 31, 32]. In this research, the various advantages and challenges of using AI in education have also been discussed. Carefully planned and thoughtfully designed training programmes can help teachers and students leverage the advantages and overcome the challenges associated with using AI for educational purposes. The interactions with the participants in this research highlighted several key concerns related to training for teachers and students. The employees working in the Ministry of Education reflected on various models of learning, as well as teaching based on the use of artificial intelligence. The interviews revealed various advantages of artificial intelligence as well as challenges associated with its incorporation into policy, practice, and pedagogy in the UAE. The important themes identified from the reflections of the respondents have been further developed in this section to build the narrative of this research. The various facts and ideas discussed in this section will be related to the research questions to address the research problem. All the interview questions have been developed in alignment with the research questions. The following sub-headings represent the key themes that have been developed from the reflections of the employees working in the Ministry of Education.

4.1. Simulated Learning Environments

At present, artificial intelligence is being widely used in various educational settings to provide adaptive, interactive, and supportive learning environments[33, 34]. In such educational settings, simulation-based learning plays a very active and important role. Real-life learning environments involve several challenges as well as problems faced by teachers and students. While some problems are specific to the teachers or students others can be related to the interaction between the two. Furthermore, learning environments in online education or correspondence courses conducted in the distance mode involve different challenges compared to traditional learning. Simulated learning environments based on the use of artificial intelligence have the potential to address all types of challenges, including those faced in traditional learning as well as distance education. Nevertheless, the adaptation of simulated learning to different types of real-life educational settings depends on the policies and decisions of educators. The implementation of effective policies and pedagogical practices can ensure that simulated learning addresses the specific needs of all types of educational settings.

Intelligent learning systems based on augmented or virtual reality present a highly interactive learning environment in which real-life situations or phenomena can be simulated[35–37]. P:9 mentioned. "*There will be personal learning, a virtual teacher, continuous assessment of student performance, and accurate analysis of results. There will be no loss of social skills that are built between teacher and student*."

Apart from AR and VR technology, natural language processing, machine learning, and deep learning also help improve simulation-based learning quality[38]. AI-based decision-making in simulated learning is also more efficient and adaptive. The experience of emotions and the emotive responses of students to academic stimuli represent two important elements of the learning process. AI technology can be effectively used to help students self-regulate their emotions and thought processes in learning environments. Intelligent tutoring systems based on AI-driven simulated learning are quite efficient in adapting to students' individual learning styles based on an understanding of their emotive responses[39–41]. The emotional states experienced by students during learning include positive as well as negative emotions. ITS technology helps students in harnessing the potential of positive emotions such as excitement and enthusiasm while overcoming negative emotions such as sadness or anger. Thus, intelligent tutoring systems can be more efficient than human teachers from the perspective of students' psychological[42, 43]. From a critical perspective, the concerns related to human touch and emotions in the learning process must also be considered. While AI tools offer several benefits to teachers and learners, education must preserve its human element. This is possible

by ensuring that the responses generated by artificial intelligence resemble human thinking and integrating the roles of human teachers and AI tools.

4.2. Artificial Intelligence and Student Creativity

The evolution of artificial intelligence technology, especially generative AI, has been accompanied by a growing interest in its potential to stimulate student's creativity. According to P:11, *"Artificial intelligence can help teachers model and exemplify creativity and critical thinking as classroom teaching strategies."* Technical AI chatbots such as chat GPT and Microsoft Copilot promote divergent thinking which can be directly related to creativity [1, 44, 45]. Divergent thinking is especially related to Chat GPT 3 and beyond [46, 47]. While educators and teachers were initially hesitant to allow such technology in classroom settings, perceptions of AI tools are certainly changing. This change in the perception of academicians can be attributed to the potential of artificial intelligence to significantly enhance creativity and problem-solving skills in students. The concept of divergent thinking is based on the cognitive ability for original ideation [48–50]. The integration of artificial intelligence with management information systems significantly contributes to decision-making, automation and predictive analysis [51]. Generative AI tools can present a wide variety of unique ideas or solutions in a matter of seconds. Through exposure to a wide array of suggestions, students learn how a problem can be approached from multiple perspectives. This not only stimulates creativity but also develops the ability for critical thinking in students. In this way, students also develop flexibility, fluency, and the capacity to elaborate. All these competencies help students explore different solutions to a problem and then elaborately present their chosen solution with fluency. This results in a significant enhancement in the creative potential of learners. The progress of research and technical advancement in the field of artificial intelligence promises improvements in Generative AI tools such as Chat GPT and Microsoft CoPilot. The experiences shared by professionals and academics reveal that responses provided by Chat GPT 4.0 are not only more creative but resemble human communication more than Chat GPT 3.5. This implies that technology based on artificial intelligence will be more useful to teachers, students, and researchers from the perspectives of creativity as well as human touch. **Figure 3** below shows how the use of generative AI by students, teachers, administrators and educational institutions is likely to grow rapidly till 2033. These statistics reflect some significant aspects of the global trends concerning the use of artificial intelligence in the education sector. According to **Figure 3**, all stakeholders in education are likely to increase the use of AI tools in the coming decade Considering these indications, educational institutions, educationists, governments, policymakers and other key stakeholders in the education sector of the UAE must take adequate steps to keep up to the global trends. The adoption of artificial intelligence must also be integrated with proficiency in the English language. This is especially relevant from the perspective of the International Educational Standards.

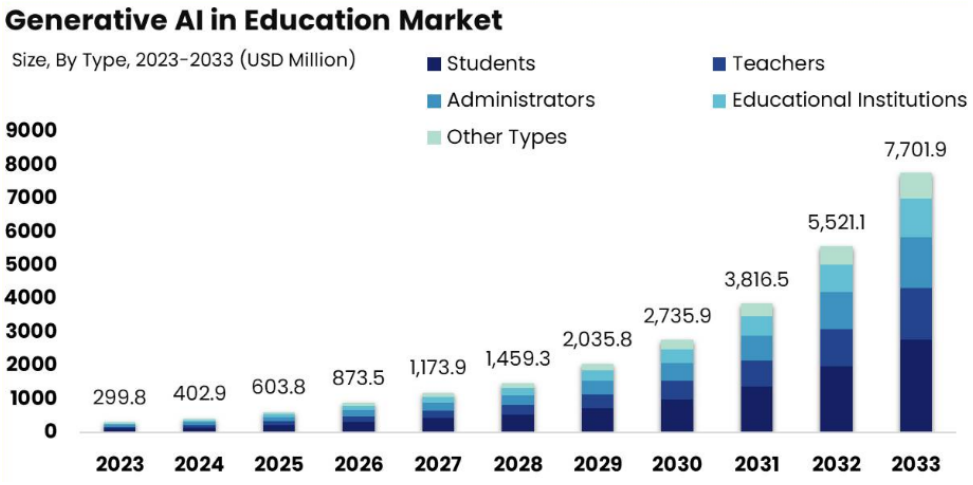

Figure 3. Use of Generative AI in Education.

Source: [9].

Existing research highlights how modern-day teachers prefer problem-solving-based pedagogies [52]. Nevertheless, the creative potential and problem-solving skills of students are sometimes stifled by an overly structured educational curriculum de [53, 54]. Thus, batch after batch of students experiences the same lessons, exercises, and patterns of evaluation. Artificial intelligence has the potential to transform this aspect of the educational system by providing exposure to updated knowledge and new ideas [55, 56]. This advantage of AI technology also justifies its incorporation in educational policy, practice, and pedagogy in the UAE and other countries.

4.3. Quality of Learning Experience

VR technology extends the learning environment beyond the conventional two-dimensional classroom to offer a more realistic and multidimensional alternative to the students. Today, the growth of research on AI and VR technology is being widely applied in the field of education [57–59]. Graphics and multidimensional colour combinations in data sets can be effectively analysed by AI artificial intelligence. In this way, such assistance from AI tools helps enhance student's creativity and problem-solving skills by stimulating their intuition [60, 61]. Animation based on the use of artificial intelligence is also known to stimulate student creativity [62]. The use of virtual reality in combination with AI technology can significantly improve the quality of the learning experience to a higher quality [63–65]. Such learning experiences, not only motivate students to gain more knowledge about the world but also enhance their capacity to appreciate complex art forms. P:8 also asserted, *"AI will enhance the process of personalizing educational content according to students' abilities, which will attract students towards learning activities that are compatible with their abilities, to raise these levels to become better."*

4.4. New Pedagogical Models for the Future

P:12 mentions, "*AI can be used to analyze labour market trends and needs, helping to update curricula to meet these demands."* The use of virtual reality and augmented reality with AI tools can result in diverse teaching models. AI and VR technology as pedagogical means introduce the concept of deep learning in teaching methods to represent a unique combination of technology with learning content [66–68]. Such application of information technology has huge potential to enrich presentations based on enhanced imagery. However, the practice of presentations using deep learning must be based on knowledge and flexibility. Hybrid evaluation mechanisms based on the use of artificial intelligence have proved to be more effective in discovering students [69–71]. Based on such evaluation teachers can help students improve their cognitive and interpretative skills by harnessing inner creativity. The exploration of advanced digital technology is also important to bring about necessary reforms in the traditional forms of teaching. Fine art teaching especially requires the replacement of traditional models by new models in today's information age. The high standards of art curriculum compel teachers to use the Internet and digital media flexibly. Simulated learning environments in fine art classrooms empower students to broaden their thinking based on their creative potential [55, 72]. Teachers must encourage learners to use AI tools ethically in a limited way to filter information while doing research. Fine art courses include several practical elements that further necessitate the replacement of traditional media with digital technology to stimulate imagination and creativity. Institutions of higher learning can cultivate students' appetite for aesthetics and humanities through simulated learning environments based on artificial intelligence [73–75].

4.5. Effective Implementation of AI in Educational Systems

With exposure to AI and VR technology, students will also be equipped to use such technology in their personal lives. Thus, students motivated by the spirit of inquiry will learn to take the initiative to gain knowledge on diverse subjects. The use of VR technology in interactive learning can help teachers plan tasks that arouse their urge to gain knowledge [76]. During the teaching process, the application of artificial intelligence can generate hints that eliminate students' doubts and boost their confidence for active participation. The teaching process can be further improved by AI-based personalised learning in which students' requirements are addressed appropriately by teachers [77]. This leads to a harmonious and equal relationship, between the teacher and students stimulating their learning initiative. When students realise that teachers do not rely on outdated curricula and

pedagogical methods, they feel further encouraged to participate in active learning. Such advanced teaching models and learning environments foster deeper learning and better internalisation of knowledge. Furthermore, students find interest in new things resulting in better concentration and an increase in their creative potential. In this way, an education policy emphasising the use of AI can redirect higher education to improve students' artistic, aesthetic, and discriminative abilities. P:8 believes that "*policies must be put in place to ensure the safety and privacy of all teachers, students and educational institutions. There must also be policies that ensure fair access to educational content and data, and those in charge of artificial intelligence must ensure that the content is free of bias and fallacies that contradict the customs, traditions and cultures of peoples.*"

Unfortunately, the use of AI in the education sector has grown very slowly in the Middle East compared to other regions of the world (**Figure 4**). This further explains the urgency for policies ensuring the effective implementation of AI in the education sector of the UAE. The global trends indicated by **Figure 4** represent a matter of serious concern for all the countries in the Middle East. Middle Eastern countries are yet to match the global growth in the adoption of artificial intelligence in the education sector.

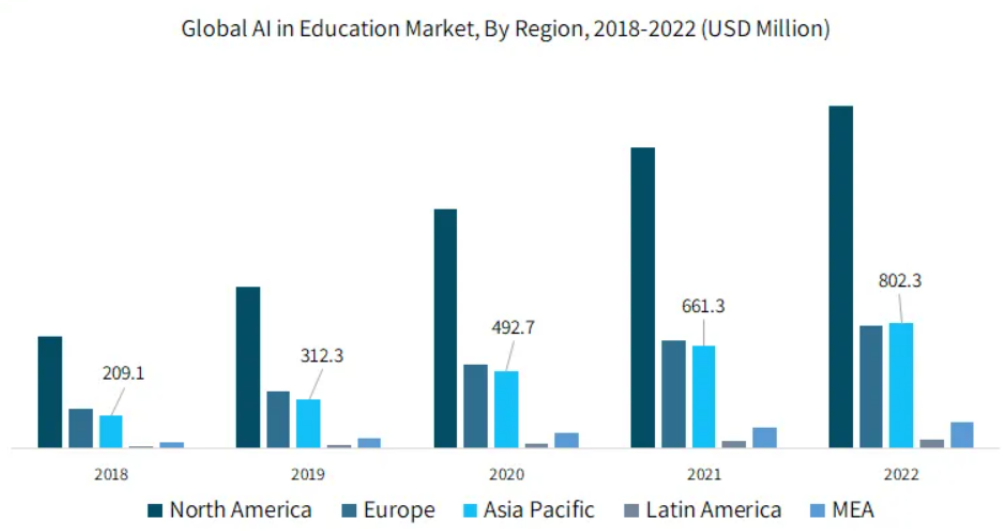

Figure 4. Use of AI in the education sector of different regions of the world.

Source: [9].

Nevertheless, the UAE is significantly ahead of other Gulf countries in various sectors, including technology, and education. The UAE should further build on its advancements in education, research, and technology in the direction of adopting artificial intelligence in the education sector.

4.6. Personalised Learning

Evaluation based on AI involves the analysis of student data on individual interests, talents, and preferences. This can yield greater benefits by providing relevant learning experiences which support the development of students' creative potential. AI can analyse students' interests by identifying behavioural patterns exhibited during the process of learning. P:12 highlighted that "*AI can analyze student performance data and identify strengths and weaknesses, helping teachers design personalized learning plans.*" For instance, integrated learning platforms can help teachers identify the disciplines or topics that students find interesting. This is supported by hybrid evaluation assessing the time spent on a topic, as well as the performance of students in related assignments. Insights gained from such assessments can be used to identify students' unique interests and talents. Based on such insights, materials, and assignments relevant to students' individual requirements may be recommended. For instance, a student showing more interest in science and technology can be further encouraged to participate in experiments or scientific projects matching their aptitude. AI can also be used to help students develop skills related to their aptitude, areas of strength, and core inter-

ests. Artificial intelligence can also generate constructive feedback guiding students' progress in the right direction [78]. Collaboration between students with similar interests can also be improved by the use of AI tools in pedagogical processes. This facilitates the sharing of ideas, information, and solutions fostering a learning atmosphere that supports the mutual development of creativity. Nevertheless, this also depends on the recognition of the importance of shared experiences and joint problem-solving by the teaching fraternity. When students find their interests and talents aligned with the learning experience, they believe the teaching process to be relevant and useful. This can not only enhance motivation and increase participation but also help students direct their creativity to the areas of interest. Additionally, teachers can improve their roles as mentors with a better and more nuanced understanding of students' interests. This can help teachers guide their students in exploring their ingenuity in educational contexts. Personalized learning driven by artificial intelligence allows students to pace their education according to their limitations. This not only has a positive impact on performance in examinations and other forms of assessments but also helps student's personal development. Students differ in terms of their learning speeds with some taking more time to understand concepts. At the same time, others may be able to learn similar concepts quickly. The suggestions and solutions generated by artificial intelligence are adjusted to the learning speeds and cognitive abilities of students. With the flexibility available in such learning environments, students enjoy the scope to explore topics of their interest in more depth. They use different approaches and methods to solve problems at their own pace resulting in a deeper understanding.

Personalized learning liberates students from the strict schedules characteristic of traditional pedagogical methods and allows them to devote more time to projects. Strict schedules and unnecessary pressure associated with course curriculum can increase the stress levels of students who may have to rush. All the constraints, stress, and rush associated with conventional methods can be avoided through personalised learning and hybrid assessment based on AI. Students requiring more time to understand a concept may feel inferior due to their failure to keep up with the pace of their classmates [79]. This diminishes their motivation and self-confidence. Personalised learning focused on the strengths and weaknesses of students makes them feel more comfortable in an educational institution. They enjoy the freedom and flexibility to explore, analyse and use new information more creatively in the absence of unnecessary stress generated by hectic schedules. Creative collaboration between students having the same preferences and ambitions also fosters a learning environment that stimulates the quest for knowledge. AI is more effective in identifying students with similar interests and aspirations when compared to human teachers. This results in better connections between students based on common interests fostering the formation of groups more focused on common objectives. The use of artificial intelligence is highly relevant in integrated platforms that allow students to share information and collaboratively deliberate on innovative projects. There are very few students with high proficiency in the English language in the UAE. This factor must be considered in personalised learning based on artificial intelligence in the UAE.

4.7. Implications

The findings of this research have some significant implications for governments, policymakers, educators, institutions of higher learning and educational technology developers. Governments, policymakers and educators must work in a concerted manner to support educational institutions in increasing both accessibility and quality of education. This requires effective policies concerning the adoption of artificial intelligence in the education sector. Such adoption should be based on an equal consideration of all levels of learning, starting from primary to higher education. Already, the Ministry of Education in the UAE is working with private organisations such as Alef Education and institutions of learning to address the issues of sustainability in education. Accessibility, data security, privacy and academic ethics constitute the core elements of educational sustainability requiring concerted efforts. Teachers and academic administrators must also coordinate their efforts in the direction of pedagogical innovations based on artificial intelligence. This is extremely important from the perspectives of student development and performance. Nevertheless, the developers of educational technology also have a significant role to play in improving learning experiences and environments. This involves the tailoring of pedagogical methods to student needs based on

an integration of AI with technology such as augmented reality and virtual reality. Using such technology students can develop the potential to present creative solutions necessary for technological and industrial innovation.

5. Conclusion

The delivery of education involves several critical aspects including academic excellence, student development, pedagogical efficiency, learning environments and sustainability. The preceding section included a discussion on the implications for various stakeholders concerning the aforementioned aspects. The recommendations in this section are based on such implications. Educational sustainability involves a focus on data privacy, security concerns and policies for the ethical use of AI[80]. Nevertheless, all these issues and concerns related to the use of AI in education, require a robust policy framework. Such a policy framework must be developed by the government in the UAE in consultation with other important stakeholders including educationists, teachers, administrative staff in educational institutions and people associated with artificial intelligence technology. The findings of this research provide adequate evidence to showcase how AI can significantly contribute to learning environments, learning experiences, student creativity, course content, educational sustainability and student evaluation. In combination with technologies such as virtual reality and augmented reality, AI has the potential to provide simulated learning environments which are more beneficial to students than conventional learning environments. In stimulated learning environments, teachers are able to apply new pedagogical models and students can also learn in a better way. This results in an overall improvement in the learning experience which stimulates innovation, creativity motivation and the desire to gain more knowledge in the students. When students take the help of AI tools, they get exposure to a wide range of information and a variety of innovative solutions. This helps them improve their capacity to generate innovative ideas and approach a problem from multiple perspectives.

In this research, the role of student creativity in delivering good performance in fine arts has also been discussed in the context of using AI in the education sector. Creativity and innovation stimulated through the use of AI tools can be equally helpful in other disciplines including those belonging to the natural sciences. The incorporation of artificial intelligence in the education sector can also facilitate reforms and changes in the curriculum in alignment with the needs of the future. Furthermore, student assessment based on artificial intelligence also helps teachers to track their progress more objectively and closely. This has a direct impact on student outcomes in terms of performance in examinations, delivery of assignments and all-round development. However, the prospect of using AI in the education sector raises concerns related to academic ethics and data security. Thus, the incorporation of the dimension of sustainability in a policy framework for using AI in education can help overcome its weaknesses and harness its potential to the fullest. Nevertheless, artificial intelligence represents a form of disruptive innovation posing significant threats to employment and human touch in different endeavours. In this context, a futuristic educational curriculum based on the use of artificial intelligence can equip students to enhance their employability. Artificial intelligence tools can significantly contribute to the development of smart learning environments. Existing research showcases the importance of such learning environments for students learning English as a foreign language[81]. Smart learning environment can specially enrich personalised and adaptive learning experiences. For instance, AI tools can be used to help students in the UAE improve English vocabulary, grammar and reading comprehension. This also indicates how the integration of artificial intelligence into the curriculum of EFL can benefit students in the UAE. The perspective of teachers including those teaching English as a foreign language cannot be overlooked either. They must develop the skills required to use AI in the teaching of English. As mentioned earlier, the English language is also critical from the perspective of prompt engineering. Teachers and instructors in the UAE must also develop the proficiency in English required for prompt engineering while using AI. It shows that the scope of the research findings are relatable to the use of English in the education sector of the UAE. This aspect assumes special significance, as most students in the UAE are not native speakers of English. The question of employability is also related to speaking and writing skills in the English language. These issues must be explored with further research.

Author Contributions

Conceptualization, R.A.Y.A. and A.G.A.; methodology, R.A.Y.A. and A.A.; software, X.X.; validation, A.A., Y.Y. and Z.Z.; formal analysis, R.A.Y.A..; investigation, R.A.Y.A.; resources, X.X.; data curation, A.A.; writing—original draft preparation, R.A.Y.A.; writing—review and editing, R.A.Y.A. and A.G.A.; visualization, X.X.; supervision, R.A.Y.A.; project administration, R.A.Y.A.; funding acquisition, R.A.Y.A. All authors have read and agreed to the published version of the manuscript.

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Conflict of Interest

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