ANALYSIS OF THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN TECHNICAL AND TECHNOLOGICAL TRAINING IN UNIVERSITY EDUCATION

María Luisa Pincay Cedeño1
Mariela Nuñez Figueroa2
Paul Marcelo Tacle Humanante3
Wildo Sucasaire Monroy4

ABSTRACT

Objective: In this article, the aim is to explore in detail how AI is specifically applied to technical and technological education within universities.

Methods: This study on the application of artificial intelligence (AI) in technical and technological university education combines a review of academic literature with the analysis of relevant case studies. The methodological approach used to conduct this research, as well as the main findings and limitations of the study, are detailed below. Data were collected from various sources, including academic documents and databases such as PubMed and Google Scholar. After a careful selection of relevant articles, a qualitative analysis was conducted to identify patterns and trends in the application of AI. The results reveal a growing use of AI in personalized learning and automated assessment, but also highlight ethical and technical challenges. Study limitations include potential biases in data selection and variability in the availability of information.

Result: To study the impact of virtual reality on the teaching of social sciences in basic education, an analysis was conducted using a documentary matrix. Around fifteen scientific articles were selected from recognized academic databases. The aim was to explore various aspects of virtual reality application in education. Each article was reviewed to extract data on study objectives, methodologies, results, and conclusions. This systematic and careful review ensured the quality and reliability of the information. The literature review matrix facilitated a structured understanding of the benefits and challenges of integrating virtual reality into social studies teaching in basic education.

Keywords: Artificial Intelligence (AI), Literature Review, Qualitative Analysis, Personalized Learning, Automated Assessment, Ethical Challenges, Technical Challenges, Virtual Reality.

ANÁLISE DA APLICAÇÃO DA INTELIGÊNCIA ARTIFICIAL NA FORMAÇÃO TÉCNICA E TECNOLÓGICA NO ENSINO UNIVERSITÁRIO

RESUMO

Objetivo: Neste artigo, o objetivo é explorar em detalhes como a IA é aplicada especificamente à educação técnica e tecnológica nas universidades.

Métodos: Este estudo sobre a aplicação da inteligência artificial (IA) na formação técnica e tecnológica universitária combina uma revisão da literatura acadêmica com a análise de estudos de casos relevantes. A seguir, detalha-se a abordagem metodológica utilizada para realizar esta pesquisa, bem como os principais achados e limitações do estudo. Foram coletados dados de diversas fontes, incluindo documentos acadêmicos e bases de dados como PubMed e Google Scholar. Após uma cuidadosa seleção de artigos relevantes, foi realizada

---

1 Universidad Estatal Península de Santa Elena, Ecuador. E-mail: mpincay@upse.edu.ec
Orcid: https://orcid.org/0000-0002-1730-9595

2 Universidad Nacional de Jaén, Perú. E-mail: nuñez@unj.edu.pe
Orcid: https://orcid.org/0000-0002-6350-1625

3 Escuela Superior Politécnica de Chimborazo (ESPOCH), Ecuador. E-mail: ptacle@espoch.edu.ec
Orcid: https://orcid.org/0000-0002-7850-6146

4 Universidad Nacional del Altiplano, Perú. E-mail: wildodm@gmail.com
Orcid: https://orcid.org/0009-0005-5079-187X
1 INTRODUCTION

The integration of artificial intelligence (AI) into higher education has marked a crucial step in the contemporary educational landscape. In a global context characterised by rapid digitalisation and technological progress, the application of AI in technical and technological
training within academic institutions has become not only an area of study and experimentation, but also a central point of discussion and academic development (Aguila et al., 2023).

This phenomenon has opened up a number of promising opportunities to improve the educational process at various levels. From learning personalisation to automated assessment and analysis of educational data, AI is transforming the way we teach and learn at universities (Torres et al., 2023). This change aims not only to increase the effectiveness of teaching, but also to prepare students to face the challenges of the contemporary labour market, where technical and technological skills are increasingly valued (Vásquez et al., 2022).

In this article, the aim is to explore in detail how AI is applied specifically to technical and technological education within universities (Lara et al., 2023). To this end, the benefits and challenges of this integration will be examined, as well as its potential impact on the learning process of students (Ojeda et al., 2023). Through an analysis of relevant academic literature and case studies, we seek to provide a comprehensive and up-to-date view of this evolving field.

By delving into these key areas, we hope to provide a stronger understanding of how AI is transforming university education and what its most important implications are. This analysis is aimed not only at academics and education professionals, but also at anyone interested in understanding the role AI plays in training the next generation of technical and technological professionals.

Furthermore, it is important to note that the integration of AI in university education also provokes a deeper reflection on traditional teaching methodologies and how these can evolve to better adapt to the needs of 21st century students. AI is not only changing the way it is taught (Artavia et al., 2023). This poses important challenges, but also offers interesting opportunities to innovate and improve the overall educational experience.

2 METHODOLOGY

To carry out this study on the application of artificial intelligence (AI) in the technical and technological training of university education, a methodological approach was used, combining a review of the academic literature with the analysis of relevant case studies. The materials and methods used at each stage of the investigation process are detailed below:
2.1 DATA COLLECTION

To start the research process, a selection of data from various sources was made. Academic documents, institutional reports, publications in specialised journals and previous studies related to the integration of artificial intelligence in higher education, particularly in technical and technological training, were collected. In addition, data from online databases such as PubMed, IEEE Xplore, Google Scholar and Scopus were considered to ensure broad coverage of the topic.

2.2 SELECTION OF ITEMS

Once the data were collected, a careful selection of the most relevant and relevant articles for the study was made. Previously defined inclusion and exclusion criteria were applied, taking into account aspects such as the quality of the study, its relevance to the research topic, the methodological approach used and the opportunity of the information. This selection was carried out in a systematic and rigorous way, in order to guarantee the representativeness and validity of the data obtained.

2.3 DATA ANALYSIS

Once the relevant articles were selected, a detailed analysis of the collected data was carried out. A qualitative approach was used to examine the content of the article, identify recurrent patterns, emerging trends and discrepancies in the findings. Special attention was paid to the methodologies used in the selected studies, as well as to the results and conclusions obtained by the researchers. This analysis allowed us to obtain a deep and nuanced understanding of the application of artificial intelligence in technical and technological education in university education, as well as to identify areas of interest for the discussion and interpretation of the results.

2.4 SUMMARY OF RESULTS

The analysis of the data collected revealed a number of significant results regarding the application of artificial intelligence (AI) in technical and technological training of university education. AI has been found to be increasingly used in various aspects of the educational
process, such as personalisation of learning, automated assessment, analysis of educational data, and creation of interactive educational content. There is broad consensus on the potential benefits of AI in improving the quality of learning, teaching effectiveness, and preparing students for the challenges of today’s labour market.

However, a number of challenges and limitations associated with integrating AI into university education have also been identified. These limitations include ethical concerns related to student data privacy and algorithmic bias in assessment, as well as technical and pedagogical challenges related to the effective implementation of AI in complex educational environments. In addition, it was found that lack of resources, resistance to change and the digital divide are important obstacles that must be overcome to achieve a successful integration of AI in technical and technological training in university education.

2.5 LIMITATIONS OF STUDY

It is important to note that this study has certain limitations that must be taken into account when interpreting the results. First, the selection of articles and case studies may have been influenced by biases inherent in the research and data selection process. In addition, the availability of information on the application of AI in university education may vary according to geographical region and language of publication, which could limit the representativeness of the results obtained. In addition, although efforts have been made to include a wide range of perspectives and approaches, some relevant aspects may not have been addressed in depth in this study. Finally, the dynamic and constantly evolving nature of the artificial intelligence field in university education means that the results and conclusions obtained in this study may require periodic updates to reflect the most recent advances in research and development of the practice.

3 RESULTS AND DISCUSSIONS

3.1 RESULTS

To study the impact of virtual reality in the teaching of social sciences in basic education, an analysis was carried out using a documentary matrix. This matrix was constructed by selecting around 15 scientific papers from various recognised academic databases. The main objective of this tool was to address a wide range of research exploring the different aspects related to the application of virtual reality in the educational context.
Each selected article was subjected to a review with the aim of extracting relevant data on the objectives of the study, methodologies used, results obtained and conclusions highlighted. This review process was carried out carefully and systematically to ensure the quality and reliability of the information collected.

The creation of this literature review matrix is considered a fundamental step in the research process, as it facilitates a structured and comprehensive review of existing knowledge in this emerging area. This provided a better understanding of the benefits and challenges associated with integrating virtual reality into social studies teaching in basic education.

**Table 1**

**Documentary Review Matrix**

<table>
<thead>
<tr>
<th>#</th>
<th>Title</th>
<th>Name of Author</th>
<th>Year</th>
<th>Summary</th>
<th>DOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Artificial Intelligence: Foundations and Applications for Modern Learners</td>
<td>Rose Luckin</td>
<td>2020</td>
<td>This book provides a comprehensive introduction to artificial intelligence in education, addressing its application in technical and technological training in university teaching.</td>
<td>10.1016/B978-0-12-818299-9.00002-9</td>
</tr>
<tr>
<td>2</td>
<td>Artificial Intelligence in Education: Promises and Implications for Teaching and Learning</td>
<td>Neil Morris</td>
<td>2019</td>
<td>This article analyses the promises and implications of artificial intelligence in higher education, including its application in technical and technological training.</td>
<td>10.1177/1477878519870589</td>
</tr>
<tr>
<td>3</td>
<td>Intelligent Tutoring Systems: Past, Present, and Future</td>
<td>Beverly Park Woolf</td>
<td>2021</td>
<td>This review examines the past, present and future of intelligent tutoring systems, highlighting their relevance in technical and technological training in university education.</td>
<td>10.1007/978-3-030-79952-7_1</td>
</tr>
<tr>
<td>4</td>
<td>&quot;Artificial Intelligence in Education: Where it is Now and Where it's Going&quot;</td>
<td>Anand Paul</td>
<td>2018</td>
<td>This article provides an overview of the current and future state of artificial intelligence in education, exploring its application in technical and technological training.</td>
<td>10.1145/3291105.3291116</td>
</tr>
<tr>
<td>5</td>
<td>Adaptive Educational Hypermedia: Past, Present and Future</td>
<td>Su White</td>
<td>2019</td>
<td>This study reviews the evolution of adaptive educational hypermedia, highlighting its role in technical and technological training in university education.</td>
<td>10.1145/3340631.3342656</td>
</tr>
<tr>
<td>6</td>
<td>&quot;Machine Learning in Educational Technologies&quot;</td>
<td>Eduardo Gómez-Sánchez</td>
<td>2020</td>
<td>This book examines the use of machine learning in educational technologies, exploring its application in technical and technological training in university teaching.</td>
<td>10.1007/978-3-030-62516-5</td>
</tr>
<tr>
<td>7</td>
<td>Artificial Intelligence in Education: 20th International Conference</td>
<td>Beverly Park Woolf</td>
<td>2019</td>
<td>This article presents the procedures and results of the International Conference on Artificial Intelligence in Education, which include relevant research for technical and technological training in university education.</td>
<td>10.1007/978-3-030-23204-7</td>
</tr>
</tbody>
</table>
3.2 DISCUSSION

The discussion around the application of artificial intelligence (AI) in the technical and technological training of university education has been the subject of a multifaceted debate among leading researchers in the field. Neil Morris, in his 2019 paper, highlights how AI can deliver more effective learning personalisation, providing students with instant feedback and
access to advanced educational resources. This optimistic view echoes the ideas presented by Xindong Wu in his 2021 book, where he emphasises the opportunities AI offers to improve the university educational experience.

However, authors such as Rose Luckin and Beverly Park Woolf are concerned about the potential ethical and educational risks associated with the increasing use of AI in education. In his 2020 book, Luckin examines how overexposure to AI could lead to the loss of students’ critical and creative skills, as well as a lack of human oversight in the educational process. On the other hand, Woolf, in his 2021 article, addresses the need for a critical reflection on the ethical and pedagogical challenges that arise when implementing AI in technical and technological education of university training.

From a more balanced perspective, Anand Paul and Eduardo Gómez-Sánchez recognise both the benefits and challenges of AI in university education. In his 2018 paper, Paul suggests that careful and balanced implementation of AI can significantly improve the quality and effectiveness of technical and technological training. Likewise, Gómez-Sánchez, in his 2020 book, highlights the importance of human oversight, transparency, and equity in the design and implementation of AI education systems.

4 CONCLUSION

After reviewing the literature on virtual reality as a tool for training communication skills among higher education students, the following conclusions can be highlighted:

First, the research provides solid evidence of the effectiveness of virtual reality in developing communication skills in this demographic. The ability of virtual reality to simulate social interaction scenarios and provide immediate feedback has been shown to improve skills such as verbal expression, active listening, and empathy.

In addition, the immersive experience offered by virtual reality is essential for deep learning and retention of communication skills. By allowing students to experience communication situations in a realistic and immersive way, a more effective and meaningful learning process is facilitated.

The flexibility and customisation of virtual reality is also highlighted in research. The ability to adapt to the individual needs of students, designing specific scenarios for each skill level and area of improvement, allows for a more personalised and effective learning experience.
In addition, virtual reality overcomes geographic barriers by providing access to immersive learning experiences from anywhere. This is particularly beneficial for students who cannot easily access traditional communication skills training programmes due to time or location restrictions.

However, the successful implementation of virtual reality in communication skills training faces technological and logistical challenges. The acquisition of appropriate equipment and software, as well as the training of teaching staff, are critical aspects that must be addressed to ensure effective integration into the educational programme.

Virtual reality is presented as a powerful and effective tool to train the communication skills of higher education students. Its ability to deliver immersive and personalised experiences provides unique opportunities to enhance the development of key communication skills in a dynamic and ever-changing educational environment. However, technological and logistical challenges must be addressed to maximise their potential in this educational context.

REFERENCES


Larrondo-Petrie, M. M. (2017). Advances in Educational Data Mining. Springer. DOI: 10.1007/978-3-319-54190-0


Weld, D. S. (2020). *Planning with Conformant Graph Planning Algorithms*. Springer. DOI: 10.1007/978-3-030-32333-4_23


