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Integration of Artificial Intelligence in Academic Teaching Practice: An Analysis in the University Environment.

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Abstract— " At the Universidad Autónoma de Coahuila, the integration of artificial intelligence has become essential in faculty academic research. This study examines how the introduction of this technology transforms the search process, highlighting its influence on the efficiency and quality of the resources discovered. The research focused on identifying the factors associated with the adoption of artificial intelligence, evaluating the frequency of its use through a case study at the Autonomous University of Coahuila, Mexico. A two-phase survey was conducted using a five-point Likert scale. The results reveal that the factors delineated in the Technology Acceptance Model (TAM) influence teachers' behavior regarding the adoption of artificial intelligence. These factors include lack of knowledge, insufficient training, resistance to change, and barriers to implementation."

Keywords- Technology adoption, artificial intelligence, Education, TAM model, University.

I. INTRODUCTION

Intelligence, conceptualized as a broad and profound mental faculty, encompasses skills such as reasoning, planning, problem-solving, abstract thinking, understanding complex ideas, quick learning, and the ability to learn from experience (Arbeláez-Campillo, Villasmil Espinoza, & Rojas-Bahamón, vol. XXVII, no. 2, 2021). This competence reflects the ability to comprehend the environment, make sense of the meaning of things, and make decisions ingeniously.

In the educational realm, virtual resources are experiencing rapid penetration in universities (Guerrero and Cervera, 2012). This transition from conventional to digital educational schemes is generating innovation and collaboration in the creation of new cultural paradigms. The university community is challenged to integrate into environments enriched with communication and information resources through the Internet (Morlan, 2010).

Current literature review highlights the growing importance of artificial intelligence (AI) in educational transformation. Internationally, successful cases demonstrate AI's capacity to improve academic performance, personalize learning, and provide instant feedback. At the national level, governmental initiatives seek to modernize the educational system in Mexico, emphasizing the need for collaboration among the government, the education sector, and the technology industry to ensure effective and equitable transformation.

The objective of this research is to analyze the level of adoption of artificial intelligence at the Universidad Autónoma de Coahuila Facultad Torreón, identifying as main adoption factors those variables defined by the Technology Acceptance Model

(TAM) by Davis et al. (1989). In this context, it seeks to determine how the lack of knowledge and insufficient training of university professors influence the adoption of artificial intelligence. The following hypotheses are proposed:

a) The greater the teacher training in artificial intelligence, the more effective the implementation of pedagogical strategies will be.

b) Active participation of teachers in artificial intelligence training programs will positively influence their disposition to adopt these technologies, influencing their adoption and use.

To test these hypotheses, a questionnaire adapted from Davis et al. (1989) was applied, based on a five-point Likert scale, at the Universidad Autónoma de Coahuila Facultad Torreón.

LITERATURE REVIEW

Given the space constraints inherent in the scientific article format, a concise review of the works and authors supporting the theoretical and analytical framework of this essay is presented. These authors not only contribute to substantiating the research but also have shaped the contemporary perspective on artificial intelligence (AI) (Arbeláez-Campillo, Villasmil Espinoza, & Rojas-Bahamón, vol. XXVII, number 2, 2021).

Technological progression has left a mark in various fields, from education to politics and society, altering organizational structures and work methods (Drucker, 2004). In the last decade, this evolution has brought about significant changes in education, stimulating the exploration of new approaches for knowledge dissemination in university environments.

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Universities have faced challenges stemming from the constant pace of technological change (Paniagua, 2004). Nonetheless, they have sought to capitalize on this technology to broaden the knowledge base and refine practices in educational teaching.

Currently, we are immersed in a society increasingly oriented towards massive technification. As all sectors submit to or adapt to technological advancements, society inevitably finds itself immersed in this trend (Yolvi Ocaña-Fernández, May/Aug. 2019). The educational sphere, in tune with society, also adapts to technological interaction communities, posing crucial questions about the extent to which technology can revolutionize education (Yolvi Ocaña-Fernández, May/Aug. 2019).

In response to the growing demands for learning, countries like the United States have implemented artificial intelligence solutions in numerous academic institutions. These solutions, organized in online environments with specific search algorithms, facilitate access to a wide range of knowledge.

Therefore, it is essential to evaluate the level of integration in academic institutions and clarify the elements that define the pattern of artificial intelligence utilization. Consequently, ease of implementation and perceived utility factors are proposed as determining components in the adoption behavior of university students.

Dimensions of Artificial Intelligence Platforms Studies

Both technological evolution and automation have introduced a new form of exclusion, separating those with access to ICT from those who do not have it. The central issue for many researchers has been the environment of educational resources and technological infrastructure that universities possess to access digital media, highlighting the implementation of educational spaces and the application of regulations that promote free access to the entire student community (Barón y Gómez, 2012).

In this context, the main study factors have been the automation of services and the development of software driven by technological change (Arriola y Butrón, 2008). However, implementation does not guarantee effective use (Domínguez, 2008; Lau, et al., 2000). Nonetheless, the integration of artificial intelligence in education raises ethical and practical issues, such as student privacy, equity in access to these advanced technologies, and the need for a solid regulatory framework to guide its implementation.

Reflecting on past experiences with educational technologies in Mexico, valuable lessons are drawn that will inform the planning and execution of the integration of artificial intelligence into the current educational system. Analyzing previous projects provides valuable information about successes and challenges, allowing for a more informed and efficient approach in this new stage of educational transformation. Authors such as Morlan (2010), Voutinioti (2013), and Matusiak (2011) have employed this model to validate and determine factors influencing technology adoption. Morlan (2010) has used it to identify appropriate strategies in the use of ICT in university environments; Voutinioti (2013) has applied it to establish the relationship between variables such as ease of use and perceived utility with the utilization and appropriation of e-government in Greece; while Matusiak (2011) has presented a study correlating the use of artificial intelligence with TAM model variables.

In summary, the essence of the model is simple and, after various evolutions, it boils down to three variables affecting individual adoption of a new technology (Cataldo, 2015): perceived utility, perceived ease of use, both leading to the intention of use. (refer to Figure 2)
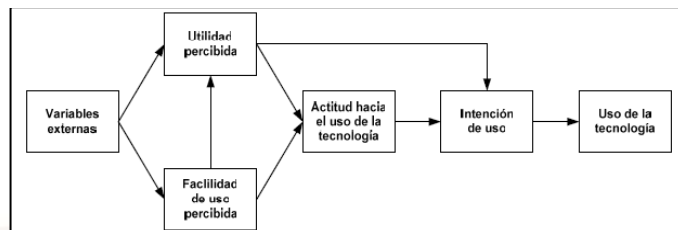

Fig. 1. Original Technology Acceptance Model

Source: Cataldo (2015)

Methodology

Various theoretical approaches have significantly contributed to research on technology acceptance, highlighting the relevance of the Unified Theory of Acceptance and Use of Technology (UTAUT). This theory identifies four key determinants of usage intention: performance expectancy, effort expectancy, social influence, and facilitating conditions. These factors, in turn, are moderated by variables such as gender, age, voluntariness or mandatory use, as well as users' prior experience (González, 2012).

Despite the existence of alternative models, the Technology Acceptance Model (TAM), used in this study, effectively validates the proposed structure, establishing its variables as crucial determinants in the adoption process. Perceived usefulness is defined as the extent to which a person believes their performance will improve through the use of a specific system. On the other hand, perceived ease of use refers to the degree to which an individual considers the use of technology to be effortless (Morlan, 2010).

Perceived ease of use, in turn, influences perceived usefulness, as easy-to-use technologies tend to be more useful. Effort savings derived from easy interaction with systems can be directed towards other tasks with the same total effort. Furthermore, simplicity in interacting with a system contributes to a greater sense of efficacy, i.e., it increases self-efficacy (Bravo & Valdivia, 2015; Morlan, 2010).

Both variables impact on attitude toward technology use, understood as an emotional response arising from the feeling of liking or disliking the use of a specific computer system or portal. According to Morlan (2010), this attitude is conditioned by both perceived usefulness and perceived ease of use. As previously noted, both perceived usefulness and attitude toward technology use positively influence usage intention, which in turn predicts effective technology use.

Hypotheses

The hypotheses have been formulated in line with the Technology Acceptance Model (TAM), establishing a direct connection between two key variables:

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H1. Lack of knowledge about artificial intelligence significantly affects the adoption of this technology, determining the perception of ease of use.

H2. Insufficient training of teachers in relation to artificial intelligence has a direct impact on the perceived usefulness of this technological tool.
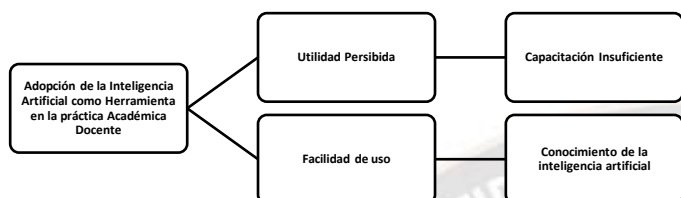

Fig. 2. Variables Affecting Artificial Intelligence Adoption.
Source: Own elaboration

Definition Construction:
a) Lack of Knowledge: (H1) Absence of information on the basic concepts of artificial intelligence.
b) Insufficient Training: (H2) Absence of effective training programs for teachers in the field of artificial intelligence.

This study explores the relationship between the level of adoption of artificial intelligence at the Faculty of Torreón of the Universidad Autónoma de Coahuila and the aspects of ease of use (familiarity with artificial intelligence tools) and perceived usefulness (teacher training for implementation). The population under analysis is the faculty members, examined through a case study conducted at the mentioned educational institution, which has 354 professors distributed across four different disciplines.
The tool used to collect data was a questionnaire, which was divided into two categories and consisted of a total of 10 closed polytomous questions based on the five-point Likert scale. These questionnaires were administered to a specific sample of the population, carefully determined.

Conclusions

Based on the two hypotheses posed, we can draw the following conclusions:

H1: The lack of knowledge about artificial intelligence appears to have a significant impact on the adoption of this technology, which in turn influences the perception of ease of use. The results suggest that an insufficient level of familiarity with artificial intelligence tools may constitute a barrier to the smooth integration of these technologies, affecting the overall perception of their accessibility and usefulness among teachers.

H2: The insufficient training of teachers in the field of artificial intelligence is directly related to the perception of usefulness of the tool. Evidence suggests that inadequate training may limit the understanding and appreciation of the advantages offered by artificial intelligence, affecting the overall perception of its utility in the educational environment.

Together, these conclusions point to the critical importance of addressing both the lack of knowledge and insufficient training in artificial intelligence to promote successful adoption and a positive perception of this technology among teachers at the Universidad Autónoma de Coahuila in the Torreón Faculty. A comprehensive approach to improving knowledge and training may be essential to optimize the implementation of artificial intelligence in the educational field.

Discussion:

The conclusion derived from the two hypotheses raises the critical importance of addressing the lack of knowledge about artificial intelligence and insufficient training of teachers in this area to promote successful adoption and a positive perception of the technology in the educational environment of the Universidad Autónoma de Coahuila in the Torreón Faculty. This conclusion raises several points that can generate discussion regarding the implementation of artificial intelligence in education.

Firstly, the relevance of knowledge about artificial intelligence in the educational field can be discussed. To what extent does teachers' knowledge of this technology directly impact students' learning experience? Cases where lack of knowledge has led to specific challenges and how greater understanding could have improved the integration of artificial intelligence in the educational process could be explored.
The result was that 89.3% of respondents practically do not use artificial intelligence tools, and the other 10.5% use it practically once a month

Another important point is the suggestion of a comprehensive approach to improving knowledge and training. What could be the key elements of this comprehensive approach? Should it include continuous professional development programs, specific educational resources, or collaborations with artificial intelligence experts? How could decision-makers at the Universidad Autónoma de Coahuila implement and effectively support this comprehensive approach?

In summary, the conclusion raises important questions about how to improve the adoption of artificial intelligence in the educational field. These questions can form the basis of a broader discussion exploring specific strategies, potential challenges, and opportunities to optimize the implementation of artificial intelligence in education at the Torreón Faculty.

Future Research:

Two fundamental variables that need to be addressed in subsequent studies are:

Resistance to Change in Artificial Intelligence Adoption:
The integration of artificial intelligence technologies in educational environments may face resistance due to the perceived complexity of the technology, concerns about replacing traditional teaching tasks, and uncertainty about how AI will impact classroom dynamics. Investigating the specific

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reasons behind resistance to change in AI adoption in education could include exploring perceptions, attitudes, and educators' willingness toward this emerging technology. Additionally, the effectiveness of training programs designed to overcome these resistances and foster wider adoption of artificial intelligence in the educational field could be analyzed.

Obstacles in Artificial Intelligence Implementation:
Successful implementation of artificial intelligence solutions often requires substantial resources, both in terms of hardware and specialized knowledge. In the educational field, lack of technical infrastructure, limited access to quality data, and shortage of artificial intelligence experts are common challenges. Investigating how to address these obstacles, whether through partnerships with industry, specific training programs for educators, or gradual implementation strategies, could provide valuable insights to drive effective adoption of artificial intelligence in the educational sector.

Research in these areas within the context of artificial intelligence in education will contribute to better understanding the factors influencing the acceptance and successful deployment of these disruptive technologies, enabling the development of more informed and effective strategies.

BIBLIOGRAPHY

[1] Adell, Jordi. (1997). Tendencias en educación en la sociedad de las tecnologías de la información. Revista Electrónica de Tecnología Educativa. Vol. 7. http://www.edutec.es/revista/index.php/edutec-e/article/view/570/299

[2] Arbeláez-Campillo, D. F., Villasmil Espinoza, J. J., & Rojas-Bahamón, M. J. (vol. XXVII, núm. 2, 2021). Inteligencia artificial y condición humana:¿Entidades contrapuestas o fuerzas complementarias? Revista de Ciencias Sociales, redalyc.

[3] Arriola, Oscar y Butrón, Katia. (2008). Sistemas integrales para la automatización de bibliotecas basados en software libre. ACIMED. Vol. 18, N°6, 1-12. http://scielo.sld.cu/scielo.php?pid=S1024-94352008001200009&script=sci_arttext

[4] Babini, Dominique; Vergara Florencia. y Archuby, Gustavo. (2007). Estadísticas de usuarios en una biblioteca virtual. El caso de la biblioteca virtual de la red Clacso. El profesional de la información, enero-febrero, Vol. 1, N°1, pp. 57-61. http://eprints.rclis.org/9512/1/vol16.1.pdf

[5] Barrios-Rubios, Andrés. (2009). Los jóvenes y la red: usos y consumos de los nuevos medios en la sociedad de la información y la comunicación. Signo y Pensamiento. 54, 265-275. http://revistas.javeriana.edu.co/index.php/signoypensamiento/article/view/4537/0

[6] Barón. Luis-Fernando y Gómez, Ricardo. (2012). De la infraestructura a la apropiación social: panorama sobre las políticas de las tecnologías de información y comunicación (tic) en Colombia. Signo y pensamiento. Vol. 31, 38-55. http://revistas.javeriana.edu.co/index.php/signoypensamiento/article/view/4408

[7] Bravo-González, Luis y Valdivia-Peralta, Maruzzella. (2015). Posibilidades para el uso del modelo de aceptación de la tecnología (TAM) y de la teoría de los marcos tecnológicos para evaluar la aceptación de nuevas tecnologías para el aseguramiento de la calidad en la educación superior chilena. Revista Electrónica Educare (Educare Electronic Journal). Mayo-agosto, vol. 19, n°2, pp. 181-196, doi: http://dx.doi.org/10.15359/ree.19-2.11

[8] Buerkett, Rebecca. (2014). Where to start? Creating Virtual Library Spaces. Mar/Apr, vol. 42 Issue 4, pp. E23-E27.

[9] Cataldo, Alejandro. (2015). Limitaciones y oportunidades del Modelo de Aceptación Tecnológica (TAM). Universidad de Atacama. Conference Paper, January.

[10] Cignoli, Nicole. (2011). Evaluation of Digital Libraries Systems' Usability and Performance through User Perception. Chinese Digital Librarianship – International Digital Libraries Perspectives ILS, Special Topics: Study Abroad in China, pp. 599-670.

[11] Davis, Fred, Bagozzi, Richard y Warshaw, Paúl (1989). "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," Management Science, vol. 35, pp. 982-1003. http://dx.doi.org/10.1287/mnsc.35.8.982

[12] Domínguez-Arroca, María-Isabel. (2008). La biblioteca universitaria ante el nuevo modelo de aprendizaje: docentes y bibliotecarios, aprendamos juntos porque trabajamos juntos. Revista de Educación a Distancia, vol. 4, n°4, pp. 1-20. http://hdl.handle.net/10760/12628

[13] Drucker, Peter. (2004). La Sociedad Poscapitalista. Colombia: Editorial Norma.

[14] Fandos-Garrido, Manuel. (2006). El reto del cambio educativo: nuevos escenarios y modalidades de formación. Rev. Educar, vol. 38, pp. 243-258. http://www.raco.cat/index.php/Educar/article/view/72357/82611

[15] Fitzgerald, Mary y Galloway, Chad. (2001). Relevance Judging, Evaluation, and Decision Making in Virtual Libraries: A Descriptive Study. Journal of the American Society for Information Science & Technology, vol. 52, n°12, pp. 989–1010. DOI: 10.1002/asi.1152

[16] González, Cam. (2006). Proyectos de bibliotecas digitales: Mitos y cambios. Revista de Profesores de Bibliotecología, 2006, vol. 1, n. 2, pp. 12-16, Perú. http://eprints.rclis.org/8486/

[17] González-Arza, Enrique. (2012). Validación de la Teoría Unificada de Aceptación y Uso de la Tecnología UTAUT en castellano en el ámbito de las consultas externas de la Red de Salud Mental de Bizkaia (estudio preliminar). Universitat Oberta de Catalunya (UOC). http://hdl.handle.net/10609/19284

[18] González-Fernández-Villavicencio-Nieves. (2012). Servicios de referencia en bibliotecas universitarias: tendencias y plan de marketing. El profesional de la información, 2012, vol. 21, n. 6, pp. 567-576. http://eprints.rclis.org/18133/

[19] Guerrero, José y Cervera, Mercé. (2012). El cambio organizacional en la universidad a través del uso de los campus virtuales desde la perspectiva de los estudiantes. Revista de Medios de Comunicación, vol. 40, pp. 75-88. http://acdc.sav.us.es/pixelbit/images/stories/p40/06.pdf

[20] Hernández-Segoviano, José., Palomo-González, Miguel-Ángel y Cantú-Mata, José-Luis. (2013). Factores endógenos y exógenos que impactan en el uso de la biblioteca en tres universidades del área metropolitana de Monterrey, Nuevo León. Investigación Bibliotecológica, vol. 27, n°61, pp. 110-120. http://www.scielo.org.mx/pdf/ib/v27n61/v27n61a4.pdf

[21] Herrera-Batista, Miguel-Ángel. (2009). Disponibilidad, uso y apropiación de las tecnologías por estudiantes universitarios en México: Perspectivas para una incorporación innovadora. Revista Iberoamericana de Educación, vol. 48, n°6, pp. 1-9. http://rieoei.org/deloslectores/2630Batistav2.pdf

[22] Martínez-Equihua, Saúl. (2007). Biblioteca digital. Conceptos, recursos y estándares. Buenos Aires; Alfagrama.

[23] Matusiak, Krystyna. (2011). Perceptions of usability and usefulness of digital libraries. International Journal of Humanities and Arts Computing, vol.6.1, n°2, pp. 133–147 Edinburgh University Press DOI: 10.3366/ijhac.2011.0044

[24] Morlan-Santa-Catalina, Iñaki (2010). Modelo de Dinámica de Sistemas para la implantación de Tecnologías de la Información en la Gestión Estratégica Universitaria. Tesis. Universidad del País Vasco / Euskal Herriko Unibertsitatea.

[25] Lau, Jesús y Cortés, Jesús. (2000) Habilidades informativas para el aprendizaje de toda la vida. En: La instrucción de usuarios ante los nuevos modelos educativos. Ciudad Juárez (Méx) Universidad Autónoma de Ciudad Juárez.

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[26] Paniagua, María-Eugenia. (2004). La formación y la actualización de los docentes: herramientas para el cambio en educación. Recuperada de: cedal.org/docus/educ01.pdf

[27] Romero-Esquivel, Raúl. (2007). Bibliotecas virtuales y alfabetización en información. Virtual libraries and information literacy, vol.7, n°6, pp. 92–99.

[28] Salinas, Jesús. (1998). El rol del profesorado universitario ante los cambios de la era digital. Agenda Académica, vol.5, n°1, pp. 131-141.

[29] Salinas, Jesús. (2004). Innovación docente y uso de las TIC en la enseñanza universitaria. Revista Universidad y Sociedad del Conocimiento. 1(1).

[30] Sánchez-García, Jaime. (2007). La falacia de la ampliación de la cobertura educativa mediante la utilización de las NTIC y la educación a distancia en la educación superior en México. Revista Iberoamericana de Educación, vol.45, pp. 123-140. https://dialnet.unirioja.es/servlet/articulo?codigo=2534451

[31] Sánchez-Díaz, Marlery y Vega-Valdés, Juan-Carlos. (2002). Bibliotecas electrónicas, digitales y virtuales: Tres entidades por definir. ACIMED, vol.10, n°6, p. 9-10. http://scielo.sld.cu/scielo.php?pid=S1024-94352002000600005&script=sci_arttext

[32] Tammaro, Ana-María. (2008). User perceptions of digital libraries: a case study in Italy. Performance Measurement and Metrics Vol. 9 No. 2, pp. 130-137. http://dx.doi.org/10.1108/14678040810906835

[33] Veiga, Jorge. (2001). La biblioteca virtual en salud (BVS): Una apuesta por la difusión de la producción científica española y latinoamericana en colaboración con la OPS/OMS. Rev. Esp. Salud Publica, julio/agosto, vol.75 n.4, pp. 277-280. http://www.scielosp.org/pdf/resp/v75n4/a01v75n4.pdf

[34] Yolvi Ocaña-Fernández, L. A.-F.-A. (mayo/agos. 2019). Inteligencia artificial y sus implicaciones en la educación superior. Propósitos y Representaciones

[35] Vidal, Ledo y Araña, Pérez (2012). Gestión de la información y el conocimiento. Revista Cubana de Educación Médica Superior, vol. 26, n°3, pp. 474-484.

[36] Villa, Herminia y Alfonso, Ileana. (2005). Biblioteca híbrida: El bibliotecario en medio del tránsito de lo tradicional a lo moderno. ACIMED, vol.13, n°2, pp. 1-20. http://scielo.sld.cu/pdf/aci/v13n2/aci05_05.pdf

[37] Voutinioti, Anastasia. (2013). Determinants of User Adoption of e-Government Services in Greece and the role of Citizen Service Centres. 6th International Conference on Information and Communication Technologies in Agriculture, Food and Environment, Magazine Procedia Technology, vol. 8, pp. 238-244. Doi:10.1016/j.protcy.2013.11.033