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Factors Influencing Intention to Teach Artificial Intelligence in Saudi Universities: A Structural Equation Model(*)

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Abstract

This study aims to investigate factors affecting behavioral intention towards teaching AI in Saudi universities. A random sampling method was used. A total of 430 responses were received. There were 330 males (76.74%), and 100 females (32.25%). All participants were of Saudi nationality and spoke Arabic as their mother tongue. To investigate sample data and assess model fit, this study employs structural equation modeling (SEM). A self-report 15- item survey instrument was developed specifically for this research study, based on Technology Acceptance Model (TAM). Study variables showed significant correlations at the .01 level. BI correlates positively with Performance expectancy (PE), Effort expectancy (EE), Social influence (SI)and Facilitating conditions (FC) (r = .555, .655, .630 and .615 respectively). Each of PE, EE, SI made significant individual contributions to the prediction of BI. The results indicated that the following beta weights which represented the relative contribution of PE, EE, SI and FC to the prediction were observed. PE (b = .411, t = 5.890, P < 0.01), EE (b = .333, t = 5.780, P < 0.01), SI (b = .297, t = 5.230, P < 0.01), and FC (b = .299, t = 5.232, P < 0.01). Together they yielded a coefficient of multiple regression (R) of 0.788 and a multiple correlation square of 0.784. With regard to the academic contribution, this work builds upon previously established and validated literature while simultaneously providing a new conceptual model.

Keywords: performance expectancy, effort expectancy, social influence, facilitating conditions, artificial intelligence.

Introduction

Scientific developments and the information and communication revolution and their advanced and renewable applications in the third millennium of the twenty-first century have brought about radical and profound transformations that have increased the speed of the communication process and improved performance, as the world is heading today to employ the fifth generation (5G) of the Internet or the so-called "Internet of Things" (Düzyol & Yıldırım, 2022).

By connecting everything that the Internet can recognize through known Internet protocols. Technical barriers are no longer an obstacle to the evolutionary extension of this service in this era. The information revolution, with its enormous strength and capacity, has become the main nerve of all possible changes in various aspects of life and in many other areas in which technology enters, which have become a feature of civilizational, technological and economic progress, and perhaps AI in management is the most prominent use of all (Xiaolin & Xiaojun, 2022).The trends of most institutions have shifted from traditional administrations to modern administrations characterized by the use of technology, by employing and benefiting from AI techniques, which in turn increases the efficiency of the performance of institutions in general and universities in particular (Dai et al., 2020). Many smart technologies based on AI have appeared, which exceeded the limit in the ingenuity of their production and the effectiveness of their use, and human minds are diligent and studying in order to adapt them in the service of educational institutions to benefits them and improve the quality of the performance of those institutions (Holmes, Bialik & Fadel, 2019).

The Kingdom of Saudi Arabia is moving towards global cognitive development, as it seeks to develop the digital infrastructure and qualify Saudi youth to face the digital information challenges of this era. On September 29, 2019, the Royal Decree No. (74167) was issued to establish the Data and Artificial Intelligence Authority, which reflects the Kingdom's commitment to the global economies based on data and artificial intelligence (Al-Hakami and Mudawi, 2023).

As the KSA educational sector has witnessed a period of continuous improvement and development in the field of education, continuous efforts

are being directed towards developing the educational system and teaching methods by using modern technologies and artificial intelligence applications. The aim is to provide high-quality educational content through school platforms, and to adopt new approaches in presenting educational curricula and methods (Al-Hakami and Mudawi, 2023).

AI has many advantages in all fields, as its use leads to raising the level of performance of workers in various departments and branches of the university, and university workers can use these advanced systems to facilitate and accelerate business. The advantages of AI include its ability to analyze problems accurately and to confront them providing appropriate information according to the situation in order to achieve results at a high level of efficiency (Kim & Kim, 2022). These systems also contribute to facilitating the decision-making process and saving the time needed for dialogue and discussion on many issues. Student achievement is one of the indicators of the quality of university performance. Therefore, university goals focus on raising this achievement, which can be improved by using AI (Cukurova et al., 2019).

The majority of AI technologies have educational and instructional uses. Education is necessary for a person's complete growth (Sulak, 2021). Theoretically, technology, particularly AI, in contemporary education enhances educational material, transforms educational perspectives, and disrupts old educational paradigms.

Educators seek technology-enhanced approaches addressing these priorities that would be safe, effective, and scalable (Walton Family Foundation, 2023). Educators see opportunities to use AI-powered capabilities like speech recognition to increase the support available to students with disabilities, multilingual learners, and others who could benefit from greater adaptivity and personalization in digital tools for learning (Office of Educational Technology, 2023).

Therefore, universities strive to improve their performance through the positive results they achieve for the individual and society as a whole, and through the standards they set in selecting human resources in various disciplines, seeking excellence in the academic and administrative aspects, and providing the appropriate organizational environment and climate (Ma

& Siau, 2018) and in this regard, artificial intelligence saves time, effort and cost, which enhances the university's quality of performance. Chang (2019) also mentioned that the level of performance of environmental management systems based on AI was effective and efficient in performing various administrative tasks.

Artificial Intelligence in Education (AIEd) is primarily concerned with the development of computers that perform cognitive tasks, typically associated with human minds, especially learning and problem-solving education for all ages should prepare society for the future and help humans achieve self-fulfillment (Alhwaiti, 2023).

Despite the aforementioned merits, there is no study known to the author at the time of this study on the effects of engineering teachers' adoption of technology in pedagogical practices on factors influencing intention to teach Artificial Intelligence in Saudi Universities.

Purpose

This study aims to investigate factors affecting behavioral intention towards teaching AI in Saudi universities.

Objectives

1- Investigating how PE affects teachers' intentions to teach AI.
2- Exploring how EE affects teachers' intentions to teach AI.
3- Investigating how SI and FC affect teachers' intentions to teach AI

Study Questions

1- How does PE affect teachers' intentions to teach AI?
2- How does EE affect teachers' intentions to teach AI?
3- How does SI affect teachers' intentions to teach AI?
4- How does FC affect teachers' intentions to teach AI?

Research Significance

AI is considered to be among modern topics that can provide valuable information to educational institutions through the results that can be reached. AI and its applications can also improve student performance and the teaching strategies used by the teacher.

Literature review

Yang et al. (2021) indicated that the implementation of AI in the education sector enhanced human betterment policy, instruction, and research. Chatterjee and Bhattacharjee (2020) conducted a study on the integration of AI into India's higher education. They found that the successful implementation of AI would greatly assist authorities in facilitating its adoption in the domain of higher education.

Technology Acceptance Model (TAM) is one of the most commonly used Information Systems Acceptance (IS) models in the research on social media adoption and acceptance. The aim of this model is to interpret user behavior towards information systems. In 1986, Davis developed a technology acceptance model based on the "Theory of Reasoned Action" developed by Fesbhein & Ajzen, 1980, and the "Theory of Planned Behavior" developed by Ajzen, 1985(Ren, Yang, Gu, Sun & Liu, 2022).

The original TAM explains the individual's use of the information system through three factors: perceived benefit, ease of use, and attitude towards use. This model assumed that the attitude towards use is a determining factor for actual use or non-use. User attitude, in turn, is influenced by two main factors: perceived usefulness and perceived ease of use. Perceived ease of use also has a direct impact on perceived usefulness. Finally, both perceived usefulness and ease of use are affected by other external variables. In 1993 Davis modified the technology acceptance model “completely” by considering that perceived usefulness has a direct effect on the intent towards the actual use of the system (Ren et al., 2022).

Technology acceptance and intentions for behavioral use are among the biggest challenges faced by educational institutions and influence patterns of use behavior among individuals.This model has four core constructs which predict users’ behavioral intention and their actual use of the system: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC).

Performance Expectancy (PE)

PE can be defined as the degree to which the student expects that using the system will help them to attain gains in academic works (Raffaghelli, Rodríguez & Guerrero-Rold´an, 2022). The higher the student's PE, the stronger the BI and UI (Venkatesh et al., 2003).

Effort expectancy EE

Venkatesh et al. (2003, p.450) defined EE as "the degree of ease associated with the use of the system". Most researchers found that effort expectancy positively influences the behavioural intention of use (Alshammari, 2021; Cheng-Min, 2019; Raffaghelli et al., 2022; Tan, 2013). When the system is easy to use, it is likely to improve performance (Davis, 1989).

Social Influence (SI)

SI is about influential and important people's views in the students' surroundings regarding the use and importance of technology use. social environment has a major impact on people's behaviours. Previous studies found SI to have a significant effect on BI (Aliaño et al., 2019; Sultan, 2021).

Facilitating Conditions (FC)

FC refers to the perception of using organizational and technological infrastructure to promote the use of new systems (Jameel, Karem, and Ahmad, 2022). Users' perception of their ability to access the resources required and support necessary for e-learning services (Jameel et al., 2022). Gunasinghe et al. (2019) reported a significant increase in BI to use e-learning due to FC.

Behaviour Intention (BI)

BI refers to the willingness to use a specific technology or system (Sultan, 2021). BI is positively influenced by PE, EE, SI, and FC (Aliaño et al., 2019; Cheng-Min, 2019; Raffaghelli et al., 2022, Sultan, 2021)

Hypotheses

H.1. PE positively affects teachers' intentions to teach AI.

H.2. EE positively affects teachers' intentions to teach AI.

H.3. SI positively affects teachers' intentions to teach AI.

H.4. FC positively affects teachers' intentions to teach AI.

Materials and methods

Sample

A random method of sampling was used. A total of 430 responses were received. They were 330 males (76.74%), and 100 females (32.25%). All participants were of Saudi nationality and spoke Arabic as their mother

tongue. They showed willingness to participate and were aged between 31 and 53 years old. The inclusion criteria included faculty members' willingness to participate in the study. A chi-square test was conducted on the data collected in the three stages, as shown in Table 1. There were no significant differences between the groups in the results ($p > 0.05$). Therefore there was homogeneity in the responses to each of the basic information questions.

Table (1) Testing for non-response bias.

	$\chi 2$	DF	*p* value
Gender	**1.032**	**2**	**0.321**
College type	**2.003**	**2**	**0.307**
Academic rank	**7.118**	**5**	**0.198**

Data Collection tool

A self-report 15item survey instrument was developed specifically for this research study, based on the TAM model. It was measured on a five-point Likert-type scale (1 = strongly disagree 5 = strongly agree). Each variable had three items. The questionnaire description was made available through the questionnaire link, and those participating in the survey did so voluntarily and with full knowledge of the survey. A group of 5 experts examined the content validity. They indicated whether questions were irrelevant or highly relevant. All items were deemed highly relevant. A content validity index at the item level (I-CVI) = 0.90. The instrument was evaluated for reliability using Cronbach's alpha (α) coefficients, where the results were greater than .7 and confirmed that it is acceptable.

Data Analysis

To investigate sample data and assess model fit, this study employed structural equation modeling (SEM).

Results

Correlation

As shown in table 2, study variables showed significant correlation at the .01 level. BI correlates positively with PE, EE, SI and FC (r = .555, .655, .630 and .615 respectively)

Table (2) Correlation of study variables

	PE	EE	SI	FC	BI
PE	**1.00**				**.555****
EE		**1.00**			**.655****
SI			**1.00**		**.630****
FC				**1.00**	**.615****
BI					**1.00**

****Correlation is significant at the .01 level (2-tailed).**

Regression Analysis

As shown in table 3, each of PE, EE, SI made significant individual contributions to the prediction of BI. The results indicated that the following beta weights which represented the relative contribution of PE, EE, SI and FC to the prediction were observed. PE (b = .411, t = 5.890, P < 0.01), EE (b = .333, t = 5.780, P < 0.01), SI (b = .297, t = 5.230, P < 0.01), and FC (b = .299, t = 5.232, P < 0.01). They together yielded a coefficient of multiple regression (R) of 0.788 and a multiple correlation square of 0.784. This shows that 78.4% of the total variance in BI of those who participated in the study is accounted for by the combination of PE, EE and SI.

Table (3) Regression of PE, EE, SI and FC on BI

	β	*t*-value
PE	.411	5.890***
EE	.333	5.780***
SI	.297	5.230***
FC	.299	5.232***
BI	.288	5.201***
R^2	.788	
Adjusted R^2	.784	

****p < .001**

Test of model fit

As a result of the four -factor CFA, the fit indices were found to be Chi square = 442.11 (p < .001), degree of freedom = 386 ($\chi 2$ = 442.11; df = 190, $\chi 2$/df = 5.03), RMSEA= .07 (p < .05), SRMR = .05, CFI= .92, NNFI = .95, GFI = .95, and AGFI= .94. (table 4.).

Table (4) Model fit indices from measurement models of the scale

Goodness of Fit Indexes	Measurement Model of the scale
χ2, df	442.11
χ2/df	5.03
CFI	.92
NNFI	.95
GFI	.95
AGFI	.94
RMSEA	.07
SRMR	.05

Structural Model

This step was intended to measure the proposed hypotheses. As shown in table 5, BI was positively impacted by PE, EE, SI and FC with p- value of 0.000 (<0.05) respectively. Thus, H1, H2, H3 and H4 were Supported.

Table (5) Results of Path and Hypotheses Tests

Hypotheses/ Relationships		Estimate	S.E	C.R	P	Comment	Label
H1	BI < --- PE	.312	.085	3.364	***	Sig.	Supported
H2	BI < --- EE	.320	.088	3.377	***	Sig.	Supported
H3	BI < --- SI	.310	.081	3.360	***	Sig.	Supported
H4	BI < --- FC	.316	.086	3.380	***	Sig.	Supported

Discussion

This study aimed to investigate factors affecting behavioral intention towards teaching AI in Saudi universities. The study employed Structural Equation Modeling to analyze the data. The results of this study are in line with prior research. For example, Lu (2019) proposed that AI technology will simulate human interaction through people's mother tongues, actions, and emotions in the future. Matsugu et al. (2003) found that AI technology may focus on the interaction between the human brain and machines in later research. Alhwaiti (2023) focused on the UTAUT 2 Model to gain deeper insight into factors that influence faculty members' occupational well-being and teaching self efficacy due to AI adoption at the collegial level.

PE and BI have a positive causal relationship. This is becuase college teachers have sufficient knowledge and experience in terms of practicality. Previous studies have found that usefulness is often a significant factor affecting behavior. There is a significant correlation between perceived usefulness and willingness to adopt Web 2.0 technologies in education (Kazoka & Mwantimwa, 2019).

Ameri et al. (2020) conducted a survey on pharmaceutical students, and the results indicated that performance expectancy (PE) and SI had positive effects on behavioral intention. Liu et al. (2019) found that PE positively affected the intention of PA apps usage. Li and Zhao (2021) conducted a study on the factors influencing continued intention to use MOOCs and found that PE had a positive effect on the intention.

EE was an influential predictor of BI. Teachers found system use easy enough that they enjoyed teaching and were able to teach in a timely fashion and effectively. This finding was supported by previous research (e.g. Abd Aziz, Kader, & Ab Halim, 2021; Tan, 2013; Raffaghelli, Rodríguez and Guerrero-Rold´an, 2022; Kim & Lee, 2020).

According to existing studies, EE plays an indispensable role in the application of technology (Liebenberg et al., 2018). Altalhi (2021) conducted a survey of 150 students on MOOC acceptance and adaptability, and the data showed that effort expectations had a significant impact on student acceptance of MOOCs.

Social influence means that when users adopt technology or services, they are influenced by the people and environment around them (Venkatesh et al., 2003). Social influence was found to be a significant factor contributing to behavioral intention to teach AI, and it was also evident how behavioral intention was affected by the social influence. According to a study on participants' reception of social networking tools for learning in India, the results showed that participants were influenced by SI which shaped their behavioral intentions (Alvi, 2021).

According to the findings of this study, AI adoption is a phenomenon dominated by universities. PE, EE, and SI made significant individual contributions to the prediction of BI.

Conclusion

The potential benefits and possible difficulties of using AI in universities are discussed within the scope of the relevant literature. The future of higher education is inextricably connected to future breakthroughs in new technologies and the processing power of emerging intelligent machines. Considering the increasing use of AI in many areas, research review, and learning guidance in recent years, the institutional strategies that will facilitate the effective use of AI applications by different stakeholder groups (such as academicians, administrative staff, and students) in universities can be a research topic. The study uses the TAM model to identify factors influencing the intention to teach AI in Saudi universities. There is a significant correlation between PE, EE, SI, and FC with intentions to teach AI. In this model, PE, EE, SI, and FC positively affect teachers' intentions to teach AI.

The current study has significant implications for the literature. Theoretically, it is one of the first studies to provide information about three interplay mechanisms that play a vital role in determining faculty members' behavioral intention to teach AI, namely: PE, EE, SI and FC. Thus it helps increase our understanding of different factors that are likely to play a role in teachers' intentions to teach AI. Practically, this research study is helpful because the current situation has imposed pressure on the universities worldwide, including the universities in my country, to shift towards AI.

Limitations

This research study is not without limitations. First, participants were recruited from only one university, Umm Al-Qura University. Therefore, the findings cannot be generalized to other universities. Second, a survey was used to collect data. Future researchers should use different methods such as personal interview or telephone interview to collect data.

Contribution and Future Research

Theoretically, technology, particularly AI, in contemporary education enhances educational material, transforms educational perspectives, and disrupts old educational paradigms. This study broadens the scope and theoretical depth of performance expectancy PE, effort expectancy EE, social influence SI, and facilitating conditions FC. To achieve this, this

study introduces components of the Technology Acceptance Model(TAM) framework in the context of instruction. With regard to the academic contribution, this work builds upon previously established and validated literature while simultaneously providing a new conceptual model. Since this is a cross-sectional study, conducting longitudinal research could tract factors influencing the intention to teach Artificial Intelligence in Saudi Universities.

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Data Availability Statement:

The raw data supporting the conclusions of this article will be made available by the author, without undue reservation.

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References

Abd Aziz, N. N., Kader, M. A. R. A., & Ab Halim, R. (2021). The Impact of Technostress on Student Satisfaction and Performance Expectancy. *Asian Journal of University Education*, *17*(4), 538-552.

Al-Hakami, R. & Mudawi, M (2023). The reality of artificial intelligence applications in public education in the Kingdom of Saudi Arabia. *Arab Journal of Informatics and Information Security, Arab League Educational, Cultural and Scientific Organization, Egypt*, 4(13), 33-76.

Alhwaiti, M. (2023) Acceptance of Artificial Intelligence Application in the Post-Covid Era and Its Impact on Faculty Members' Occupational Well-being and Teaching Self Efficacy: A Path Analysis Using the UTAUT 2 Model, Applied Artificial Intelligence, 37:1, 2175110, DOI: 10.1080/08839514.2023.2175110

Aliaño, Á. M., Hueros, A. M. D., Franco, M. D. G., & Aguaded, I. (2019). Mobile learning in university contexts based on the unified theory of acceptance and use of technology (UTAUT). Journal of New Approaches in Educational Research, 8(1), 7–17.

Alshammari, S. H. (2021). Determining the factors that affect the use of virtual classrooms: A modifi-cation of the UTAUT Model. *Journal of Information Technology Education: Research, 20*, 117-135.

Altalhi, M. M. (2021). Towards understanding the students' acceptance of moocs: a unified theory of acceptance and use of technology (UTAUT). *Int. J. Emerg. Technol. Learn.* 16, 237–253. doi: 10.3991/ijet.v16i02.13639

Alvi, I. (2021). College students' reception of social networking tools for learning in India: an extended UTAUT model. *Smart Learn. Environ*. 8, 19. doi: 10.1186/s40561-021-00164-9

Ameri, A., Khajouei, R., Ameri, A., and Jahani, Y. (2020). Acceptance of a mobile-based educational application (labsafety) by pharmacy students: an application of the UTAUT2 model. *Educ. Inf. Technol*. 25, 419–435. doi: 10.1007/s10639-019-09965-5

Cheng-Min, C. (2019). Factors Determining the Behavioral Intention to Use Mobile Learning: An Application and Extension of the UTAUT Model. Front. Psychol., https://doi.org/10.3389/fpsyg.2019.01652

Chang, W. Y. (2019). A Data Envelopment Analysis on the Performance of Using Artificial Intelligence-Based Environmental Management Systems in the Convention and Exhibition Industry. *Ekoloji Dergisi* 28(107): 3515-3521

Chatterjee, S., & Bhattacharjee, K.K. (2020) Adoption of artificial intelligence in higher education: a quantitative analysis using structural equation modelling. *Educ Inf Technol* 25, 3443–3463. https://doi.org/10.1007/s10639-020-10159-7

Cukurova, M, Kent, C, & Luckin, R (2019), Artificial intelligence and multimodal data in the service of human decision-making: A case study in debate tutoring, British journal of educational technology. Volume 50, 2019 - Issue6.

Dai, Y., Chai, C. S., Lin, P. Y., Jong, M. S. Y., Guo, Y., and Qin, J. (2020). Promoting students' well-being by developing their readiness for the artificial intelligence age. Sustainability 12:6597. doi: 10.3389/fdgth.2021.739327

Davis, F. D. (1989). Perceived usefulness, Perceived ease of use, and user acceptance of information technology. *MIS Quarterly 13*(3), 319–339.

Düzyol, E., & Yıldırım, G. (2022). Examination of the Opinions of Pre-School Teachers Regarding the COVID-19 Pandemic Period's Reflection of Pre-School Education. *Psycho-Educational Research Reviews, 11*(2), 261–280. https://doi.org/10.52963/PERR_Biruni_V11.N2.17

Holmes, W., Bialik, M., and Fadel, C. (2019). Artificial intelligence in Education. Boston: Center for Curriculum Redesign. doi: 10.1007/978-3-319-60013-0_ 107-1

Jameel, A.S., Karem, M.A., Ahmad, A.R. (2022). Behavioral Intention to Use E-Learning Among Academic Staff During COVID-19 Pandemic Based on UTAUT Model. In: Al-Emran, M., Al-Sharafi, M.A., Al-Kabi, M.N., Shaalan, K. (eds) Proceedings of International Conference on Emerging Technologies and Intelligent Systems. ICETIS 2021. Lecture Notes in Networks and Systems, vol 299. Springer, Cham. https://doi.org/10.1007/978-3-030-82616-1_17

Kazoka J. E., Mwantimwa K. J. (2019). Perceived usefulness and ease of use of web 2.0 tools in university teaching and learning in Tanzania. *Adv. Mob. Learn. Educ. Res.* 14, 19–37.

Kim NJ & Kim MK (2022) Teacher's Perceptions of Using an Artificial Intelligence-Based Educational Tool for Scientific Writing. Front. Educ. 7:755914. doi: 10.3389/feduc.2022.755914

Li, Y., and Zhao, M. (2021). A study on the influencing factors of continued intention to use moocs: UTAUT model and ccc moderating effect. *Front. Psychol*. 12, 528259. doi: 10.3389/fpsyg.2021.528259

Liebenberg, J., Benade, T., and Ellis, S. (2018). Acceptance of ICT: applicability of the unified theory of acceptance and use of technology (UTAUT) model tosouth african students. *Afr. J. Inform. Syst*. 10, 160–173. Available online at: https://digitalcommons.kennesaw.edu/ajis/vol10/iss3/1

Liu, D., Maimaitijiang, R., Gu, J., Zhong, S., Zhou, M., Wu, Z., et al. (2019). Using the unified theory of acceptance and use of technology (UTAUT) to investigate the intention to use physical activity apps among university students in Guangzhou, China: cross-sectional survey. *JIMIR Mhealth Uhealth* 7, e13127. doi: 10.2196/13127

Lu, Y. (2019). Artificial intelligence: a survey on evolution, models, applications and future trends. *J. Manag. Anal.* 6, 29. doi: 10.1080/23270012.2019.1570365

Ma, Y. & Siau, K. (2018). Artificial intelligence impacts on higher education. Proceedings of the Thirteenth Midwest Association for Information Systems Conference, Saint Louis, Missouri May 17-18, 2018.

Matsugu, M., Mori, K., Mitari, Y., and Kaneda, Y. (2003). Subject independent facial expression recognition with robust face detection using a convolutional neural network. *Neural Netw.* 16, 555–559. doi: 10.1016/S0893-6080(03)00115-1

Office of Educational Technology (2023). Artificial Intelligence and the Future of Teaching and Learning Insights and Recommendations. https://www2.ed.gov/documents/ai-report/ai-report.pdf

Raffaghelli, E., Rodríguez, M. and Guerrero-Rold´an, A. (2022). Applying the UTAUT model to explain the students' acceptance of an early warning system in Higher Education Computers & Education, 182, 104468, www.elsevier.com/locate/compedu

Ren L, Yang F, Gu C, Sun J & Liu Y. (2022). A study of factors influencing Chinese college students' intention of using metaverse technology for basketball learning: Extending the technology acceptance model. Front Psychol. 20; 13:1049972. doi: 10.3389/fpsyg.2022.1049972.

Sulak M (2021) Yapay zeka teknikleri ile açik öğretim lisesi öğrencilerinin mezuniyet tahmini [Predicting graduation of open education high school students with artificial intelligence technics] Unpublished M.Sc. Social Science Institute, Karabük University, Karabük

Sultan, A. (2021). Determining the Factors that Affect the Use of Virtual Classrooms: A Modification of the UTAUT Model. Journal of Information Technology Education: Research, 20 117-135. https://doi.org/10.28945/4709

Tan, P. (2013). Applying the UTAUT to Understand Factors Affecting the Use of English E-Learning Websites in Taiwan. SAGE Open 3(4), DOI:10.1177/2158244013503837

Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*, 425-478.

Walton Family Foundation (March 1, 2023). Teachers and students embrace ChatGPT for education. https://www.waltonfamilyfoundation.org/learning/teachers-and-students-embrace-chatgpt-for-education

Xiaolin, X. & Xiaojun, L. (2022). Artificial Intelligence for Higher Education Development and Teaching Skills. Hindawi Wireless Communications and Mobile Computing Volume 2022, Article ID 7614337, 10 pages https://doi.org/10.1155/2022/7614337

Yang, S., Ogata, H., Matsui, T. & Chen, N. (2021). Human-centered artificial intelligence in education: Seeing the invisible through the visible. *Computers and Education: Artificial Intelligence.* Volume 2. https://doi.org/10.1016/j.caeai.2021.100008