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The Effect of Using Artificial Intelligence on Learning Performance in Iraq: The Dual Factor Theory Perspective

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ABSTRACT

The adoption of artificial intelligence applications in higher education plays an important role in the improvement of the quality of education and learning practices and overcomes many educational' issues. The purpose of this study is to examine the factors influencing learning performance by using artificial intelligence in the educational process. The research model has been developed based on dual factor concept through examining "enablers" and "inhibitors" factors of artificial intelligence adoption in higher education toward improving the Learning Performance. The research model has been built based on a combination of the following theories, constructivism, TAM3, UTAUT, BM, status quo bias theory. The hypothesized model is validated empirically via a questionnaire including 57-item based on 5-point Likert scales completed by 383 respondents (random sampled). Structural equation modeling was used to evaluate the proposed model by analyzing the confirmatory factor and path effects across the AMOS software. The results demonstrate that the indicators of model fitness showed good fit. As for the results of the hypothesis test, it is clear that the results of the analysis show that the interaction and the engagement of learning have a significant effect on the collaboration for learning and thus have a significant effect on the learning performance. Perceived enjoyment, perceived usefulness, and perceived ease of use have a significant effect on using artificial intelligence. Facilitating conditions have no significant impact on using artificial intelligence. Consciousness has a positive effect on use while perceived risks and resistance do not significantly affect use and learning performance. The use of artificial intelligence has a positive and significant effect on learning performance.

1. INTRODUCTION

The learning and education sector has witnessed remarkable developments in recent years due to the development of technology. Searching on the Internet has become part of school learning, and tablets have replaced books or some of them in universities. But all these developments that surprised us recently, may lose their shine in the face of what is expected from the entry of artificial intelligence into the education sector, which has already begun to rise, promising unprecedented transformations in the field of this sector. Until recently, the human wanted the machine to perform the physically arduous or mentally exhausting tasks, instead of him or with him, provided that he would take over the leadership alone. Then his needs evolved to the use of artificial intelligence in thinking and making decisions among several alternatives [1].

Artificial intelligence is one of computer science branch. Its simplest definition is that it is the science that makes machines think like humans, that is, a computer with a mind. One of the definitions also shows that artificial intelligence has certain behaviors and characteristics that characterize computer programs that make them mimic human mental abilities and patterns of work. Among the most important of these characteristics is the efficiency to learn, deduce [2].

Artificial intelligence science aims in the learning to develop systems that achieve a level of intelligence similar to or better than human intelligence AI applications are designed to imitate the actions of the human mind.

The term (AI) is an acronym for (Artificial Intelligence). It means the ability to perform similar actions that an intelligent being can do, such as the ability to learn from mistakes, think and make appropriate decisions according to mental thinking. [3].

Intelligent tutoring system, is a system that includes educational programs that contain an element of artificial intelligence where the system tracks the work of students and guides them whenever required by collecting information on the performance of each student separately. It can also highlight the strengths and weaknesses of each learner, and provide the necessary support for it in due course. AI applications in education will enable new boundaries of learning to be discovered and accelerate the creation of innovative technologies. It has become one of the pillars of educational development in the developed world, and one of the most important ways to develop study materials, and is considered one of the most important applications of artificial intelligence in education beside the following: [4].

Expert systems: the primary goal is to help students in thinking processes and achieve their goals.

Neural networks: The way the human brain works is similar to the human nervous system, and it enables students to undertake many educational projects by answering questions.

Digital systems for schools in the sense of establishing interconnected data networks, through which large-scale neural networks can be established, which can anticipate vulnerabilities and how they can be addressed by all students, and contribute to information management and address problems first-hand.

Contribution to the work of algorithms in the establishment of educational tools that reformulate and elaborate educational curricula in a manner that is appropriate for students 'interest, to reach the shortest way in order to deliver study materials and develop student capabilities to communicate with human-like systems, which is the largest catalyst for them and preparing and supplying immediate interaction with people in all linguistic and social situations, which helps to enhance the ability to communicate and increase social skills [5].

This paper includes the following sections, Introduction of the study is in section 1, the research model and hypotheses have been demonstrated in Section 2, the measurement method has been proposed in section 3, while section 4 presents the data analysis and discussion, lastly, section 5 presents the study conclusions including implications and limitations.

1.1 Advantages of using artificial intelligence in higher education

The inclusion of the principle of AI in higher education gives the ability to meet some of the biggest challenges that higher education is experiencing in our time. One of the most important advantages of adopting artificial intelligence techniques in higher education is the possibility of using these systems to adapt educational programs to the needs of students. By applying higher levels of individual learning, with a greater focus on specific topics may be a way that reveals the weaknesses of each student, where students can get additional support as there are already some special educations and learning programs that depend on AI that can assist learners in basic writing, math, and any other subjects. Through these programs students can learn the basics, but they can't assist students in the creativity and thinking skills. However, this should not exclude the possibility that AI teachers can do these things in the future [6]. With the rapid pace of technical progress that has characterized the past few decades, artificial intelligence systems can change the role of teachers, there will always be a role for teachers in the field of education, but this role and its changes may change because of the new technology in the form of intelligent computing systems. Artificial intelligence systems can take on tasks such as classification, and it can help students improve learning and may even be a substitute for private lessons in the real world. However, AI can be adapted to many other aspects of teaching as well. But in most cases, artificial intelligence will transform the role of the teacher into the role of the facilitator to make learning trial and error less intimidating [7].

1.2 Artificial intelligence in education: How does it help us?

Classrooms are expected to soon move from the traditional framework of learning to using a combination of custom-designed robotics and artificial intelligence. A large and growing proportion of students will benefit from robots that are durable and resilient, and classroom teachers will be freed from administrative matters and will be devoted to focusing on students. Teachers often suffer from the abundance of office work, such as correcting exams and assessing assignments, but artificial intelligence can perform many of these tasks, and reduce the time required for correction and administrative work in order to devote more time to students. For the classroom itself, the options for "specialized services according to needs" provided by artificial intelligence technologies would help improve students' enjoyment during lessons and improve their grades at the same time. Well-trained robots can complement the role of experienced teachers in providing extra lessons and lessons to strengthen and develop students' skills [8].

Artificial intelligence can also contribute to limiting the information explosion and the steady technical and cognitive development, to the point that it is expected that the validity of the knowledge that one learns in the future will be limited to five years, and if the development of scientific curricula and the printing of textbooks is a long and complex process that may take in turn five years .With artificial intelligence in educational hardware and software, you will be able to extract the knowledge and skills required at a certain time, and thus update the lessons automatically and present them to the student in a manner that suits his needs and abilities [9].

2. RESEARCH MODEL AND HYPOTHESES

The study model and hypotheses have been developed based on the theories and models shown as follows:

2.1 Constructivism theory

The constructivist theory is based on the premise that the behavior of the individual is governed by his cognitive construction, and that what the learner has from previous knowledge greatly affects what can be added to him in terms of learning or new knowledge. The philosophy of this theory is based on the principle of interaction, engagement, and collaboration in the educational process in a way that enables students to obtain the knowledge necessary for learning. This theory helps the learner to learn new knowledge by building it on their own through the development of their learning or scientific research processes [10, 11]. We derived the following hypotheses from this theory:

H1: Interaction is one of the success factors of the educational process. In many cases, students being simply passive observers and they have little or don't have any chance to participate. Where this kind of instructions may affect an audience. Effective learning has needed interaction [12].

Interaction helps the teaching and learning process smoothly and can increase communication between learners. Many studies show that classroom interaction is important in the educational process. Numerous studies have shown that student interaction occurs in the classroom [13, 14]. From the above, we can formulate the first hypothesis:

"There is a significant relationship between interaction for learning and collaboration for learning"

H2: Concept of engagement is a specific perception of the interaction between students and educational institution. Therefore, the educational institution must provide an environment that provides all the facilities and techniques for learning that will increase student knowledge by absorbing the

concept of engagement [15].

Peter et al., in their study (2016) highlighted giving the student more space for participation and discussion in the learning process, the continuous encouragement and cooperation students among them gives them a greater motivation to learn [16].

(Jehangir) says in her study conducted in one of the colleges of Mumbai in India (2017) that engagement in education has a positive role in motivating students to learn, she adds that each student participates in an active learning experience. These results show a high level of student engagement that other forms of learning cannot [17]. Accordingly, the following hypothesis was formulated:

"There is a significant relationship between engagement for learning and collaboration for learning"

H3: The literature proved that there is a positive and significant relationship between collaboration for learning and performance, in a study conducted by Al-Rahmi et al. [18] in five Malaysian universities, and a questionnaire distributed to 723 students was used, the results of which showed positive and significant relationship between collaboration learning and performance. The techniques of artificial intelligence play an important role in the collaboration of the users in the educational process, and is represented by a group of users who work together in order to achieve a specific goal, and therefore a reflection on their performance, and as a study conducted by Al-Rahmi et al. [18] indicated that the use of Artificial Intelligence in Collaborative Education is a positive tool that improves student performance. Accordingly, the following hypothesis was formulated:

"There is a significant relationship between collaboration for learning and learning performance".

2.2 TAM3 model

This model was developed by Venkatesh and Bala in 2008 by adding many variables to it, and this model plays an important role in influencing the intentions of individuals to adopt smart technologies in the educational process, perhaps among these variables: perceived usefulness, perceived ease of use, and perceived enjoyment [19-21], and we derived the following hypotheses from it:

H4: Previous studies presented the positive relationship between perceived enjoyment and artificial intelligence.

In the Master Thesis submitted by Figueiredo [22], which relied on a model whose component was (enjoyment), the enjoyable motivation was defined as the pleasure that people get from using artificial intelligence. The results indicated that the use of artificial intelligence in education made it more enjoyable for students, so that education is no longer limited to memorization and boring repetition. It made it even more entertaining. Likewise, the results presented by a study [23] indicated that the perceived enjoyment in adopting new techniques stimulated students to learn, as it adopted a model called (ARTP). The phenomenon of using artificial intelligence in higher education has had an effective impact on learning through the perceived enjoyment that these intelligent technologies add to the learning institution. According to what has been mentioned, the following hypothesis has been formulated:

"There is a significant relationship between perceived enjoyment and use artificial intelligence"

H5: The literature proved that there is a positive and significant benefit from the use of artificial intelligence in educational institutions. During a study conducted by Subrahmanyam and Swathi [24] the results show the significance of the use of AI. His study proved that integrating the strategy of artificial intelligence in educational science provides capabilities that would help the teacher and the student with the possibility of parents participating in the educational environment by providing them with the required information about their children (1), as shown in a study conducted by Pedro et al. [25] who found that that the use of artificial intelligence in cooperative education is a means and leads to improving students 'performance and motivating them to participate in learning (2). Accordingly, the following hypothesis was formulated:

"There is a significant relationship between perceived usefulness and use artificial intelligence"

H6: In a study conducted on a sample of Saudi university students by Binyamin [26], which was done through a questionnaire distributed electronically, it is found that when students deal with an easy-to-use learning system, there will be great acceptance from students to use it. Its ease of use will make it more likely to be used. Venkatesh et al. [27] demonstrated in his study that simple and easy-to-use technologies will be seen as of greater benefit. Moreover, the tangible benefit and ease of use enhance students' acceptance of the use of technologies in higher education institutions. The ease and flexibility of using artificial intelligence techniques in the educational aspect will distance the student from the state of confusion and the reluctance to deal with it, which in turn will lead to fewer errors resulting from the use of these technologies. From this point the following hypothesis has been formulated: "There is a significant relationship between perceived ease of use and use artificial intelligence".

2.3 Unified theory of acceptance and use of technology

It is one of the important theories in the study of organizations adopting new technology, and many studies have proven its effectiveness in this field. This theory is based on several theories such as: TAM, TRA, motivational model [28], C-TAM-TPB, TPB, the model of personal computer utilization [29], IDT, and social cognitive theory [30], that have been developed by Venkatesh, and the theory indicates that the intention of the individuals to use technology is affected by four basic structures: performance expectancy, effort expectancy, facilitating conditions, and social influence. In this study, the researchers adopted the facilitating conditions from this theory. We derived the following hypotheses from it:

H7: The study proved [6] there is a positive and significant relationship between facilitating conditions and artificial intelligence, that was conducted in higher education institutions in India, a questionnaire was used, which was distributed to 329 students, the results of which showed that there is a positive and significant relationship between facilitating conditions and artificial intelligence [6]. Many literary studies have proven the availability of the necessary resources for the use of artificial intelligence and knowledge to use it through training courses or there are specific people to help that will have a significant and positive role in the use of artificial intelligence in educational institutions which in turn leads to improve education and accordingly the following hypothesis has been formulated:

"There is a significant relationship between facilitating conditions and use artificial intelligence".

2.4 Belief model and consciousness

The belief model is designed to predict the behavior of individuals and then to identify why individuals do not use artificial intelligence in the educational process [31-33]. The following hypothesis has been derived from this model:

H8: Consciousness plays an important role in adopting artificial intelligence. Consciousness is defined as "the degree to which an individual realizes the importance of artificial intelligence in education in a way that leads to improving their educational performance". Does the individual realize the importance of adopting artificial intelligence in the educational process? Artificial intelligence provides tools for developing an accurate and detailed picture of how the human brain works. The digital and dynamic nature of AI also provides opportunities for student participation that are not provided by textbooks or the traditional classroom environment. In other words, the applications of artificial intelligence in education accelerate the discovery of new learning frontiers, and the creation of innovative technologies. In a study conducted by Shanahan [34], it is shown that artificial intelligence is the place where consciousness plays a vital role and a drive towards its adoption. Also, in one of the studies conducted in China, it is shown that individuals have an interest in consciousness and will make a great effort towards the use of artificial intelligence [35]. Accordingly, the following hypothesis was formulated:

"There is a significant relationship between consciousness and use artificial intelligence".

2.5 The dual factor theory

This theory indicates that the organization faces two different sets of factors when adopting or using any technology, and these factors are either driving the individuals towards the use of artificial intelligence in education, or they may be inhibiting (preventing) the individuals towards the use of artificial intelligence in education. These factors differ from each other and generate separate effects on the usage decision, and thus this theory will be relied upon to clarify the extent to which individuals use artificial intelligence and their resistance in the educational process,and then its reflection on educational performance in an integrated model [36-38]. The following hypotheses is derived from this theory:

H9: A study conducted by Karjaluoto et al. [6, 39] proved that perceived Risk (PR) has a negative effect for teachers who rely on the use of intelligence techniques in learning. Thus, perceived risks are related with the negative feeling of the users of AI in higher education Accordingly, the following hypothesis can be formulated:

"There is a significant relationship between perceived risks and use artificial intelligence".

2.6 The status quo bias theory

The philosophy of this theory is based on the failure of individuals to change their current status, and to maintain the current situation as it is now [40] by facing pressure to change the current situation due to beliefs about the expected negative effects of change; Therefore, the resistance to any change arising from the adoption of a new technology or a new system that stands behind it. A set of interpretations are inhibitors of a new technology or system [41], and in this regard (Samuelson) describes inhibitors in three main categories: (a) psychical commitment arising from misperceived values costs, regret slip, or a force for consistency; (b) cognitive misperceptions in the appearance of perceived value and inertia; and (c) rational decision building in the proximity of uncertainty and transition costs.

Inhibitors have been defined as negative factors that oppose changing the current situation or discouraging their use. Also, inhibitors refer to the perspective of beneficiaries towards the resistance to change the status quo and to maintain the current situation [42]. Polites and Karahanna [43] indicate that individuals do not know that the benefits accruing from the new technology is an important aspect of maintaining the current situation. Therefore, these inhibitors are among the necessary postulates that must be studied to address and solve problems facing organizations in this direction. So, according to the theory of the status quo, factors considered as inhibitors to use artificial intelligence in education include resisting change: The tendency of the organization to favor the current situation, even with other alternatives available [43]. The following hypotheses are derived from this theory:

H10: The literature demonstrated that there is a significant relationship between perceived risks and learning performance. In a study conducted by Lam et al. [44] on international students studying in Malaysian universities, a questionnaire was used distributed to 515 students, the results of which showed the significance of the relationship between risk and performance by identifying five Major elements of risk (Financial risk, Opportunity costs, Family or socio-cultural risk, Legal administrative risk, Academic or course risk). Likewise, the study of Zainuddin [45], used in this study, adopted a mixed method to collect data, combining personal interviews and a questionnaire that was distributed to a sample of students, where the results confirmed that the students were positive in terms of better performance if compared to the risks perceptive. Accordingly, the following hypothesis can be formulated

"There is a significant relationship between perceived risks and learning performance"

H11: The literature proved that there is a significant relationship between resistance bias and use artificial intelligence, in. In a study conducted by Longoni et al. [46] Prove it is proven that the resistance to artificial intelligence is at its highest level when the person benefiting from it believes that it is more distinct and that artificial intelligence will replace it and thus it will waste its time and effort [31], In addition, many of the literature has proven that there is resistance from the use of artificial intelligence as a result of the unfamiliarity of these technologies and may be seen with difficulty in dealing with them in addition to these techniques are always constant during practical applications and thus we may lose the flexibility of dealing in classes Accordingly, the following hypothesis can be formulated:

"There is a significant relationship between resistance bias and use artificial intelligence"

H12: The literature indicates that reducing individuals' resistance to education has a clear effect on enhancing their educational performance. The results of studies indicate that diagnosing and reducing the sources of resistance leads to improving the performance of individuals during the learning process [47]. Therefore, the following hypothesis can be formulated:

"There is a significant relationship between resistance bias and learning performance"

H13: in a study he [48] conducted on a number of students

through an intelligent algorithm that was developed called "DOCE" state that there is a positive relationship when using artificial intelligence techniques in scientific institutions. This technique has also been recommended in a study for mutual collaboration between students in classes, and in a study conducted by Popenici and Kerr [49] through handling the problem he posed in his study, relating (the breadth of participation in higher education and the continuous increase in the number of students, the size of classes, staff costs, and financial pressures on universities). He concluded in this study that the interaction in the use of artificial intelligence is the best solution to solve all these problems and it is time for universities to rethink the use of modern technologies in their educational process. The future of higher education is closely related to new developments, the most important of which is artificial intelligence and the use of its techniques in higher education. Accordingly, the following hypothesis can be formulated:

"There is a significant relationship between use artificial intelligence and collaboration for learning"

H14: Komarudin [50] proved that there is positive correlation between intelligence and learning performance. When the learning management system is integrated with modern technology, this will lead to the establishment of a learning model that gives teachers and learners wider learning possibilities. According to the above, the following hypothesis has been formulated:

"There is a significant relationship between use artificial intelligence and learning performance".

3. METHODS

3.1 Study approach and model

The survey method has been adopted in this study in order to determine the influences among the study constructs. Thus, the study model has been developed based on related studies' results and literature review which focuses on discovering the influences of factors affecting on the performance of learning by using artificial intelligence as an integrative model from the dual factor perspectives of "enablers" and "inhibitors" as shown in the proposed model in Figure 1.

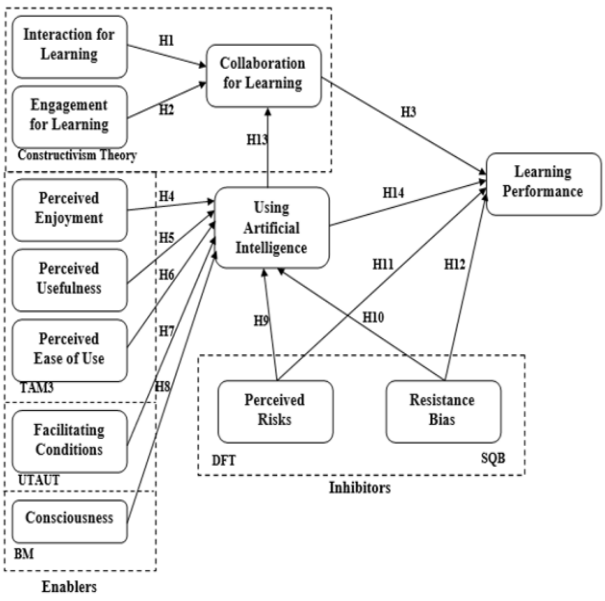

Figure 1. Research model and hypotheses

3.2 Questionnaire design and source of data

This study aims to explore the influences of factors affecting learning performance through the use of artificial intelligence. The survey was also conducted from 15/3/2020 to 1/9/2020. 383 questionnaires have been received for analysis. As for the questionnaire, it was designed on the basis of the literature on this subject and according to a five-point Likert scale. Table 1 clarifies the contents of the questionnaire.

Table 1. Measurement items

Variables	References
Interaction for Learning	[10, 51, 52]
Engagement for Learning	[10, 51, 53]
Collaboration for Learning	[10, 51, 54]
Perceived Enjoyment	[10, 54-58]
Perceived Usefulness	[10, 18, 54-60]
Perceived Ease of Use	[10, 54-59]
Facilitating Conditions	[6, 55, 59]
Consciousness	[55]
Perceived Risks	[61]
Resistance Bias	[61]
Using Artificial Intelligence	[10, 18, 54-57, 60]
Learning Performance	[10, 51, 54]

3.3 Pilot test

In order to ensure the validity of the questionnaire and the metrics, the researchers conducted a pilot study on 35 randomly selected respondents, who were removed from the final survey. The suggestions resulting from the survey were taken into consideration in the final questionnaire of the study.

3.4 Statistical methods

In order to perform the statistical analysis, structural equation modeling was used to test the causal relationship between the measurement variables in the research model. The main reason for using structural equation modeling is because it takes into consideration several equations simultaneously [42]. Amos software was used for the analysis.

4. DATA ANALYSIS AND DISCUSSION

Table 2. Demographic Information

Characteristics	Number of Respondents	(N=383)
Gender	Male	279
	Female	104
Age	<= 40	254
	41 – 50	129
Your level of computer experience	No experience	2
	Beginner	33
	Average	87
	Expert	261
The number of distance courses	<5	137
	>5	246

Before starting the hypothesis test, the validity of the scale should be checked, and for this reason a pilot study was conducted on a sample of 30 respondents, while they were excluded from the final survey. With regard to data analysis, SEM was used to verify the reliability and validity of data and

then test the proposed hypotheses. Initial results showed that the model is reliable and valid for testing, except for some questions that were removed from the final data. Then data was obtained by building an electronic questionnaire for respondents. Table 1 shows the demographic data for the study sample. It is found in Table 2 of the study sample that 68.75 is for males, while the rest of the percentage is for females. It is also clear that the largest proportion of the sample has been within age group (20-40 year), at a rate of 56.94. As for the level of Internet use, it was is found that the majority of individuals in the sample have an interest in using the Internet.

Moreover, the Structural Equation Modeling (SEM) was used to analyze the empirical data and through Amos program.

4.1 Multicollinearity

For the purpose of hypothesis testing, the authors examined the issue of multicollinearity so that the results are appropriate for regression analysis, and for this was used (VIF) and it was found that the values fall between 1.485 and 2.215 and this indicates that there is no multicollinearity in this data.

4.2 Internal consistency and validity

The authors examined the quality of the model by assessing discriminant validity, content validity, and convergent validity as shown in Table 3.

Table 3. Factor loadings, Cronbach's Alpha, CR and AVE

Constructs		Loadings	Cronbach's Alpha	CR	AVE
Interaction for Learning	INT1	0.821	0.713	0.880	0.719
	INT2	0.711			
	INT3	0.783			
	INT4	0.724			
	INT5	0.783			
	INT6	0.742			
Engagement for Learning	ENG1	.785	.802	0.832	.707
	ENG2	.852			
	ENG3	.794			
	ENG4	.820			
	ENG5	.793			
Collaboration for Learning	COL1	.813	.802	.843	.723
	COL2	.806			
	COL3	.823			
	COL4	.835			
	COL5	.764			
Perceived Enjoyment	ENJ1	.705	.794	.811	.701
	ENJ2	.654			
	ENJ3	.813			
Perceived Usefulness	USE1	.830	.811	.823	.719
	USE2	.761			
	USE3	.792			
	USE4	.860			
	USE5	.850			
Perceived Ease of Use	EAS1	.822	.821	.856	.743
	EAS2	.760			
	EAS3	.837			
	EAS4	.858			
	EAS5	.833			
Facilitating Conditions	FAC1	.827	.832	.864	.757
	FAC2	.847			
	FAC3	.854			
Consciousness	CON1	.785	.796	.821	.721
	CON2	.816			
Perceived Risks	RIS1	.831	.887	.896	.773
	RIS2	.888			
	RIS3	.842			
	RIS4	.744			
Resistance Bias	RES1	.780	.783	.0826	.712
	RES2	.767			
	RES3	.863			
Using Artificial Intelligence	ACT1	.850	.809	.834	.736
	ACT2	.864			
	ACT3	.821			
	ACT4	.771			
	ACT5	.738			
Learning Performance	PER1	.856	.873	.887	.745
	PER2	.852			
	PER3	.756			
	PER4	.860			
	PER5	.867			
	PER6	.896			

According to what was mentioned in the above table, it should be verified whether it was according to the criteria specified in the literature, as the evidence indicated that the value of the loadings should be greater than 0.60, while the values of CA and CR should be greater than 0.70, either the value of AVE must be greater than 0.50, so it is clear from this that the results specified in the table are greater than the criteria specified in the literature and therefore this is an indication of the validity of testing the hypotheses proposed in the study model.

4.3 Structural model

We examined the predictive power of the proposed study model through the value of R2, where the results of the analysis revealed that the value of the R2 is sufficiently (R2 = 0.924) to explain the factors affecting on learning performance through the use of artificial Intelligence in Iraqi higher education. As for the results of the proposed study hypotheses test in the study model, the method of structural equation modeling has been adopted , which is a hypothetical pattern of linear relationships between a set of inherent variables and observation, and in particular the use of the path analysis method because this method has several advantages appropriate for the nature of the study , as well as being more effective as it takes into account modeling of interactions between variables, nonlinearity, measurement errors, and double linear correlation. Table 4 and Figure 2 show the results of the effect hypothesis test.

Table 4. Overall summary of the hypotheses

Hypothesis				Estimate	S.E.	C.R.	P	Study Results
H1	COL	<---	INT	.238	.040	5.931	***	Acceptance
H2	COL	<---	ENG	.689	.101	6.823	***	Acceptance
H3	PER	←-	COL	.868	.118	7.338	***	Acceptance
H4	ACT	←-	ENJ	.326	.033	9.948	***	Acceptance
H5	ACT	<---	USE	.472	.042	11.235	***	Acceptance
H6	ACT	<---	EAS	.095	.025	3.820	***	Acceptance
H7	ACT	<---	FAC	.026	.021	1.222	.222	Reject
H8	ACT	<---	CON	.136	.027	5.090	***	Acceptance
H9	ACT	<---	RIS	.109	.126	.864	.388	Reject
H10	ACT	<---	RES	.070	.073	.962	.336	Reject
H11	PER	<---	RIS	.184	.122	1.502	.133	Reject
H12	PER	<---	RES	.033	.024	1.358	.175	Reject
H13	COL	<---	ACT	.501	.064	7.808	***	Acceptance
H14	PER	<---	ACT	.303	.049	6.239	***	Acceptance

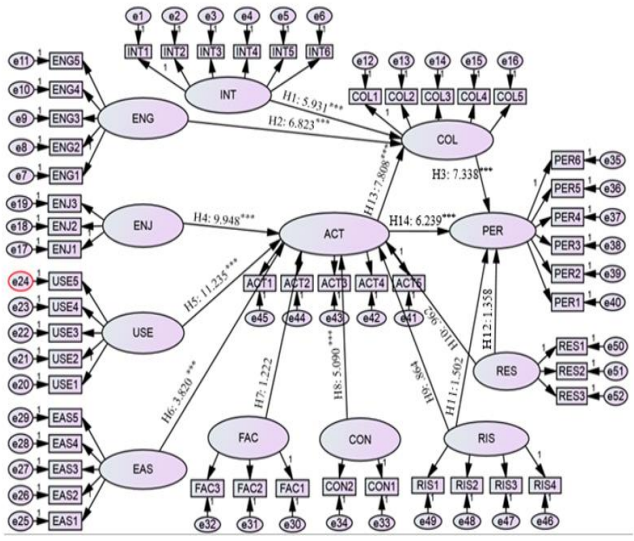

Figure 2. Hypotheses testing results

4.3.1 The results

The aforementioned table shows the effect relationships, to the effect significance , where the significance level (0.05) was relied upon to judge the extent of the effect significance, as the calculated significance level was compared with the value of the approved significance level (0.05), and the effects are statistically significant when the value of the calculated significance level is smaller than (under the level) of the approved significance level (0.05) and vice versa, also the value of CR has been relied upon. Accordingly, these results indicate: the path "there is a significant relationship between interaction for learning and collaboration for learning." reached (5.931) which is statistically significant at the level of significance (0.000). And the path: "there is a significant relationship between engagement for learning and collaboration for learning" reached (6.823) which is statistically significant at the level of significance (0.000). And also, the path: "there is a significant relationship between collaboration for learning and learning performance" reached (7.338) which is statistically significant at the level of significance (0.000). While, the path: "there is a significant relationship between perceived enjoyment and use artificial intelligence" reached (9.948) which is statistically significant at the level of significance (0.000). Also, the path "there is a significant relationship between perceived usefulness and use artificial intelligence" reached (11.235) which is statistically significant at the level of significance (0.000). As for the path "there is a significant relationship between perceived ease of use and use artificial intelligence" reached (3.820) which is statistically significant at the level of significance (0.000). The path "there is a significant relationship between facilitating conditions and use artificial intelligence" reached (1.222) which is not statistically significant at the level of significance (0.222). Also, the path "there is a significant relationship between consciousness and use artificial intelligence" reached (5.090) which is statistically significant at the level of significance (0.000).

In addition, it shows the path "there is a significant relationship between perceived risks and use artificial

intelligence" reached (0.864) which is not statistically significant at the level of significance (0.388). Also, the path "there is a significant relationship between resistance bias and use artificial intelligence" reached (0.962) which is not statistically significant at the level of significance (0.336). Hence, the path "there is a significant relationship between use artificial intelligence and collaboration for learning" reached (7.808) which is statistically significant at the level of significance (0.000).

While, the path "there is a significant relationship between perceived risks and learning performance" reached (1.502) which is not statistically significant at the level of significance (0.133). And, the path "there is a significant relationship between resistance bias and learning performance", reached (1.358) which is not statistically significant at the level of significance (0.175). Thus, the path "there is a significant relationship between use artificial intelligence and learning performance", reached (6.239) which is statistically significant at the level of significance (0.000).

4.3.2 The discussion

The results of our study show support for the proposed research model, as it was revealed through the analysis the importance of the model in explaining the performance of learning through the influence of artificial intelligence, which means that Iraqi academic organizations have an interest in applications of artificial intelligence and their use in performing educational tasks. As it is evident through the results that all hypotheses are accepted with the exception of Hypothesis 7, and therefore this is a positive indication and reinforcement of our model. The results of the analysis can also clarify that the factors represented by interaction and engagement are important variables that play a major role in enhancing aspects of cooperation for the educational process, as indicated in the results of the two hypotheses test and in terms of CR and Beta values. These results were consistent with the results of previous studies as a study [10, 18, 56, 57, 60, 62, 63].

In addition to the perceived enjoyment, perceived usefulness and perceived ease of use as possible factors for using artificial intelligence in the educational process that play an important role in enabling individuals to use artificial intelligence in education. The results indicate that the perceived usefulness factor obtained the highest value among these factors, which means that individuals acknowledge the benefits achieved from the use of artificial intelligence in the educational process, also that individuals feel pleasure and entertainment while using artificial intelligence, not facing difficulties or problems during their use of artificial intelligence in education, and these results are consistent with the results of previous studies represented by Ye et al. [10, 58, 61]. As for another factor, they were represented by consciousness, as the test results indicated that individuals had the necessary and clear awareness of the applications of artificial intelligence in the educational process, and this result is consistent with a study [61].

The facilitating conditions factor, the results indicate a rejection of the hypothesis. This result is consistent with a study by Chatterjee [6].

In the same direction, the results of the hypotheses regarding the inhibitory factors indicate that they are evident, and therefore these hypotheses have been rejected. This means that the factors of concrete risk and resistance do not affect individuals' use of artificial intelligence in the educational process, as well as educational performance, and thus this can be interpreted that there are no fears and risks from the use of intelligence. Artificial, as well as non-resistance of individuals. These results were consistent with the studies [61]. Therefore, and according to the above, artificial intelligence and cooperation for learning play an important and decisive role in students' practice of their educational activities, such as discussion among themselves, information exchange, as well as knowledge sharing. Thus, the use of artificial intelligence in education preserves the ability of educational organizations to preserve their academic civilization and to develop their knowledge.

5. CONCLUSION

The present study tackles the process of identifying and analyzing the factors affecting the academic performance of the students through the use of artificial intelligence by identifying the factors identified by the theories in this area, especially the theory of bilateral perspective. The results showed the validity of the proposed specific model factors (except for the conditions facilities factor). As for the factors represented by "perceived risk and resistance," their rejection is a positive sign and indicates that they do not affect the use of artificial intelligence and thus their academic performance. On the other hand, the review of literature shows that there is a paucity of studies that focused on the double factor perspective, so we tried to fill this gap.

Moreover, it is clear from the model proposed on the desire of academic organizations to improve the performance of its members academic through the use of artificial intelligence, but the important point to focus on is that it must be interested in the educational process to continue to focus on the factors that increase the use of artificial intelligence and enhance their performance.

5.1 Theoretical implication

This study shows how artificial intelligence technology can contribute to the development of an unparalleled conducive and positive learning environment for learning between teachers, students and all parties to the educational process (stakeholders). The advantage that it adds to the learning environment is that the authors built their theoretical model according to the perspective of the dual factor and relying on the theory of (constructivism theory, TAM3, UTAUT, BM and the status quo bias theory), and on the basis of combining these theories we built our theoretical model, and the main reason that led us to this is not adopting artificial intelligence technology from a single perspective, where it must be studied in two ways: enabling and discouraging. Therefore, this work provides an opportunity for researchers to study other topics along this path.

5.2 Practical implications

Our study results show students' use of artificial intelligence and its positive reflection on their academic performance. The results show that interaction and participation for learning plays an important role in raising the level of cooperation for learning among students through the use of artificial intelligence applications, and ultimately this affects their academic performance. Likewise, the results also showed that

the tangible pleasure from the use of artificial intelligence, the tangible benefit, and the tangible ease of use from the applications of artificial intelligence in learning affect the students' use of artificial intelligence during the learning process, which in turn also affects the academic performance and leads to raising their level of performance. In the same direction, the results show that the awareness students possess about the applications of artificial intelligence in education greatly affects students' use of these applications, and thus significantly affects their academic performance. In addition to facilitating the conditions that do not affect the use of artificial intelligence according to the result of the study, this means that students have a lack of resources necessary to use artificial intelligence in education, and in the end, it negatively affects their performance.

As for the perceived risk and resistance, the results showed that the lower the risks arising from artificial intelligence, the more students tend to use it, and the more universities tried to reduce students' resistance to using artificial intelligence, this was positively reflected towards the continuity of their use of artificial intelligence in education. So, on their academic performance.

Moreover, the results indicate that the use of intelligence by students in their academic learning increases their academic performance.

5.3 Limitations and future research

Despite the new results presented by this study, there are still some limitations, including: the study sample, which was limited only to universities, and excluded schools, in addition to that, this study focused on students only, and therefore these results cannot be generalized to the teaching staff. Also, one of the deficiencies that was discovered through our study is that there is a lack of resources necessary for the use of artificial intelligence by students, which requires academic organizations, as well as governments, to provide the necessary supplies for students to practice their educational tasks.

The study proposes future actions represented in conducting the study in all Iraqi universities and institutes, in addition to that, conducting the study at the level of developing countries to find out more obstacles.

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