AI Tools' Impact on Student Performance: Focusing on Student Motivation & Engagement in Iraq

Haady Abdilnibi Altememy

college of Islamic Sciences/ The Islamic university in Najaf, Iraq

Email: haady.altememy@*gmail.com

Nour Raheem Neamah

Al-Manara College for Medical Sciences, Amarah, Iraq

Email: nourraheem1@uomanara.edu.iq

Rabaa Mazhair

College of education/ Al-Farahidi University/Iraq

Nada Sami Naser

Department of Arabic Language, College of Education, Sawa University, Almuthana, Iraq

Email: dr.nada@sawa-un.edu.iq

Ali Afrawi Fahad

Department of Media/ Mazaya University College\ Iraq

Nazar Abdulghffar al-sammarraie

College of Arts, Department of Media/ Al-Esraa University, Baghdad/ Iraq

Email: nazar@esraa.edu.iq

Hidab Rasul Sharif

College of technical engineering/ National University of Science and Technology, Dhi Qar, Iraq

Email: hadab.r.sh@nust.edu.iq

Mohamed Amer Alseidi

Al-Hadi University College, Baghdad 10011, Iraq

Email: dr.mohamed.alseidi@huc.edu.iq

Mohammed Yousif Oudah Al- Muttar

Scientific Research Center, Al-Ayen University, Thi-Qar, Iraq

Email: mohd.yousif@alayen.edu.iq

Abstract

The students are the upcoming future drivers of the economy and the nation, and their academic performance plays a significant role in their practical field. In this dimension, this study has aimed to investigate the role of up-growing AI tools on students' academic performance in Iraq and has also evaluated the mediation role of student motivation and student engagement in the relationship between AI tools and students' performance. This study has adopted a quantitative approach and has collected data from 312 university students enrolled in different universities in Iraq. The analysis software which the researcher has used for data analysis and a hierarchal regression model was applied for the hypotheses testing. The analysis has shown the significant impact of all the addressed variables on the student's performance. This study has highlighted sufficient knowledge for the practitioners and researchers as well as the limitations of this study for conducting future research.

Keywords: AI tools, student engagement, student motivation, student performance

1. Introduction

Technological adoption and advanced innovative diversities have prevailed in every dimension of life, and their vast advantages have value for every part of life, including the educational sector and its benefits for students (Guilherme, 2019). Artificial intelligence has provided several convenient ways to the education department for quality delivery of knowledge, alternative ways to maintain the learning stream of students, and diverse options for the understanding of concepts, but artificial intelligence seeks technical and innovative infrastructure that has been observed as a big challenge for the developing countries including Iraq. Current advanced learning way has created an intense environment for the teachers, policymakers, and the management of educational institutes to meet the challenges of learning systems sifts, cultural changes in school, policy shifts, and change in teaching methods (Aldulaimi, Kadhim, & Alfaras, 2018), and the current infrastructure of Iraqi educational institutes reflect their appeal for their innovation and revolution according to the advanced artificial intelligence and innovative educational mediums and modes.

Several artificial intelligence tools have been established that have diversified and provided different educational knowledge. The most popular AI tools include ChatGPT, Gradescope, fetch, Ivy Chatbot, and many others that provide educational

facilities and diverse knowledge access to students (McFarland, 2023), but these opportunities demand robust technological implementations and smooth innovative educational Infrastructure that seem rather critical for developing countries like Iraq. AI tools and other specialized sources of knowledge have personalized all the learning available on the Web, at the same time, have provided it all over the globe and generalized it simultaneously; and these contributions have played a significant role in the learning ability, educational performance and knowledge capability of students and teachers both (Owoc, Sawicka, & Weichbroth, 2019).

Students are the main asset of any country as they are the future potential workers, the policymaker, and the decision-makers of their own lives and the nation; artificial intelligence has provided a rigorous flow of knowledge and skills to polish and nurture the students for the mentioned purposes and their academic performance as well (Khanzode & Sarode, 2020). The AI software and tools have empowered the students with the availability of multi-dimensional skills, information, and access to various alternative ways for their working and have reflected a dominant role on the student's performance and the lack of skills in the staff and other tutoring bodies (Baidoo-Anu & Owusu Ansah, 2023). Studies have recently explored the significance of different AI tools and have discussed that these technologies have sped up the learning process, are time-saving, and have improved the personal learning of students (De la Vall & Araya, 2023). External factors like student engagement in education and student motivation can further boost the student learning method and academic performance growth. Student motivation has been investigated and concluded to be raised by using online learning methods along with classroom learning, and this phenomenon has been observed to play a supportive role in increasing students' engagement in their educational activities. These studies have discussed the significance of AI tools, student's motivation, and engagement in different demographical and geographical boundaries providing a valuable factor to explore in Iraqi educational institutes.

By considering the empirical evidence provided by these recently mentioned past studies, this study has investigated the impact of AI tools on students' performance by the mediating role of student motivation and engagement. This study

will enlighten the practitioners, teachers, and the management of educational institutes to reconsider and rebuild their ways of working according to the current changing attributes of technology. This study will contribute to the literature by providing a viewpoint of the current status of Iraq from the perspective of artificial intelligence and concepts related to the students at different educational institutes. The successive portions of this study will provide the readers with a literature review, the methodology of the study, the calculated results, and their discussion, and, in the end, the conclusion, limitations, and future suggestions for research.

2. Literature Review

2.1. Theoretical Background and Conceptual Framework

The current research is based on determining the influence of AI tools on the performance of students during their academic careers, where student motivation and student engagement are crucial for enhancing their academic performance within their institutions. AI is the most widely accepted innovation in several sectors of human life (Raffaghelli et al., 2022). Consequently, many educational institutes are striving and struggling to introduce AI tools for their students to provide them with personal support, which will significantly boost their academic performance. To support the present research framework, the researcher has utilized the *"Unified Theory of Acceptance and Use of Technology (UTAUT)"* as evidence thus proposed by Venkatesh et al. (2003), according to which the AI learning environment has been characterized as an innovation in education, and many students are not aware of its usage and feel hesitated to adopt such innovations within the education system, and this theory highlights the acceptance and necessity of AI-driven tools and technologies (Wu et al., 2022). However, the present study has chosen the UTAUT theory as evidence to support the framework because it will motivate the students to effectively adopt the AI tools, which will provide them personal support for their academic career, an ultimatum for boosting the students' performance.

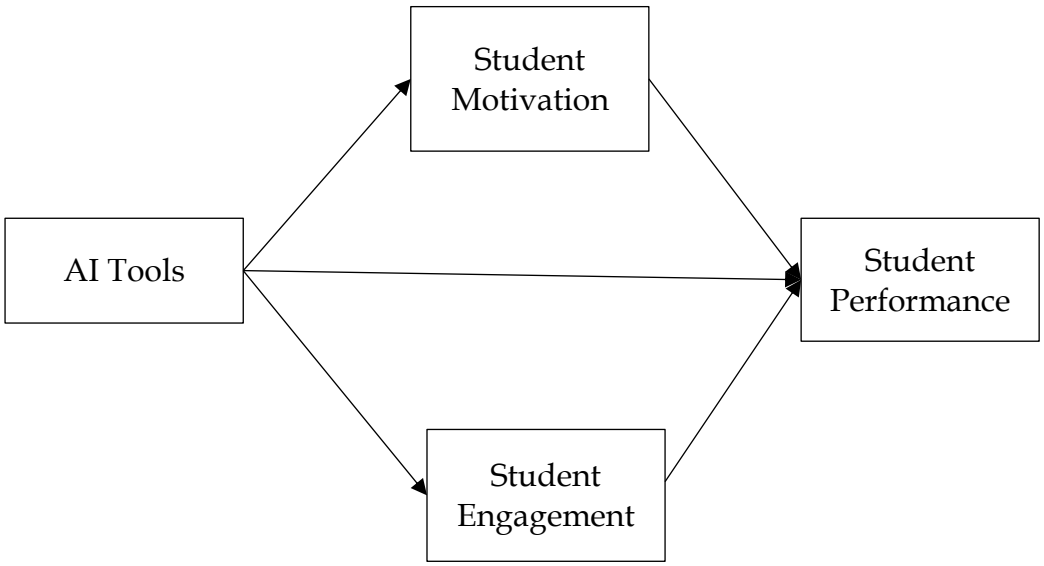


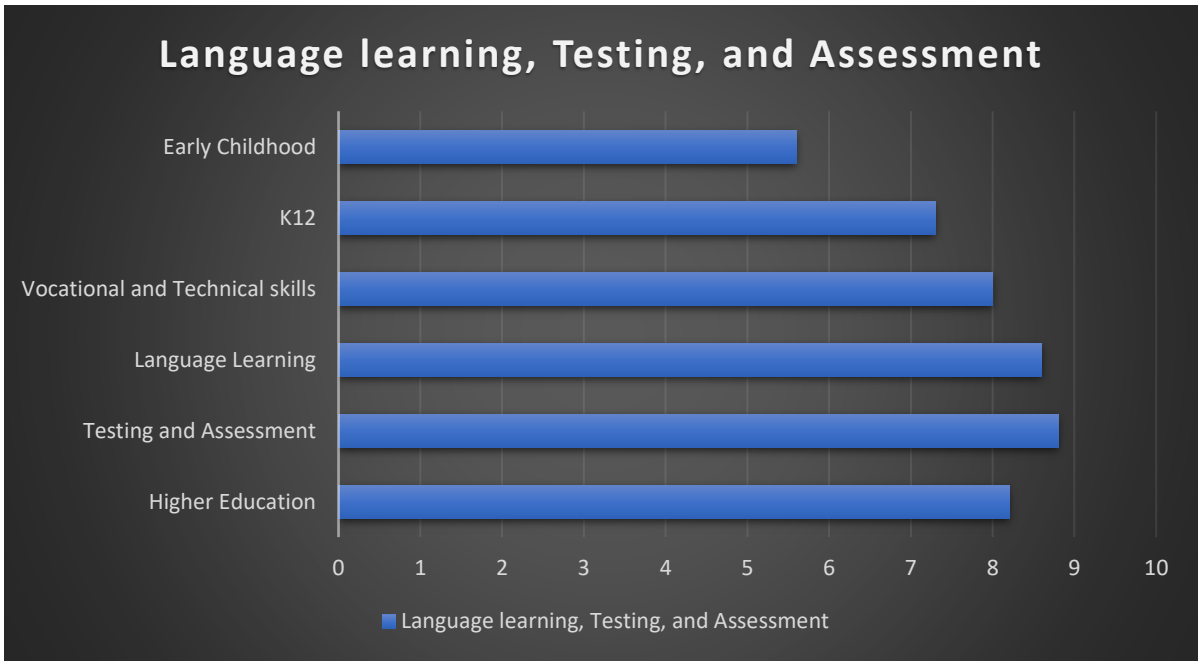
Figure 2.1: Conceptual Framework

2.2. AI Tools and Student Performance

In this modern era, artificial intelligence has been crucial in enhancing the processing and facilitating the working of human brains through machine learning (Semmler & Rose, 2017), and it can be illustrated that AI can work as a bicycle for the human brain to work with efficacy and divert its attention immediately from one point to another. When thinking of the educational sector, AI is the major application that can develop the education sector in this digital world and can benefit the students by boosting their learning capabilities, creativity, modifying the ways of training for the students, and enhancing their engagement which will eventually fasten up the performance of students within their academic career (Muñoz et al., 2023). AI has several applications that can facilitate students in their academics, such as tutoring systems and technological platforms for efficient and active learning, and these digital programs have a greater potential to enhance students' performance (Adiguzel, Kaya, & Cansu, 2023). However, different AI tools such as Chat GPT, Chatbot, and many other applications significantly influence student performance and are yet to be researched on a broader scope.

The researcher in the current research believes that AI tools could considerably enhance students' performance. An example could be taken from research undertaken by Yoon et al. (2019), which illustrates that Chat GPT, an online learning and tutoring

AI application, when utilized by students for their academic assistance, significantly enhances the learning outcomes of the students and their performance was extraordinary as compared to their classmates who were not using Chat GPT. On the other hand, research has also illustrated that incorporating Chat GPT or other AI tools has considerably boosted students' academic performance (Takeda et al., 2018). Therefore, the current research has focused on AI tools because it significantly facilitates students enhancing their performance and enables them to learn languages effectively. This could be evidenced by a survey where language learning, testing, and assessments have been thought to be efficient at various education levels in the presence of AI (as explained in Graph 2.1).



Graph 2.1: Impact of AI on language learning, testing, and assessment at different education levels (HolonIQ, 2023)

The above graphical analysis supports that AI tools are beneficial for enhancing the students' grip on their language and academic courses at higher education levels and early childhood and K12 levels. To summarize, the educational system of Iraq should incorporate numerous artificial intelligence tools such as Chat GPT, Chatbot, etc., because it has been evidenced that AI tools are crucial for providing personal support in their academics at different levels, and this is a key to enhance the student's performance, which is the innovation of the current research.

H1: *AI tools significantly and positively influence student performance.*

2.3. Role of Student Motivation as a Mediator

Student motivation is the key construct between the association of AI tools and student performance because a motivated and enthusiastic student could significantly accept and utilize the new technology to have personal support in their academic career. Additionally, it can be illustrated that student motivation significantly impacts their learning outcomes. According to previous research, student motivation is defined as the internal force within students that compel them to understand a particular subject or language and directs their behaviors toward achieving a particular goal (Ryan & Deci, 2000). Moreover, recent research has elaborated that student motivation is the fact that it is explicitly connected to the participation of the students within their classes and academics, and to promote effective learning, it is crucial to enhance the motivation of students (Dörnyei, 2020). Therefore, the current research has focused on determining the necessity of student motivation as a mediator between AI tools and student performance because a motivated student can perform well in the class compared to the other students.

Furthermore, it has been observed that when students prioritize utilizing AI tools such as Chat GPT or Chatbots, they are more motivated toward their academic goals and intentions, and this motivation is the key to improving their performance and ensuring successful outcomes throughout their academics (Yilmaz & Yilmaz, 2023). Despite being beneficial for students, Chat GPT has also enabled teachers to provide their students with great assistance, significantly enhancing their motivation (Liu et al., 2023). However, the researcher in the undertaken study believes that if students are motivated toward their classes and language learning processes with the aid of Chat GPT or other AI tools, they are prone to perform well in their academics, which signifies the mediation of student motivation between AI tools and student performance.

Additionally, the tools thus powered by AI play a pivotal role in enhancing the motivation of students toward their academics by providing them with personal support, and this motivation positively boosts their performance (Yılmaz & Yılmaz, 2022b). Conclusively, it could be noted that the higher the student motivation toward adopting AI tools, the higher their academic performance. Therefore, this research has prioritized incorporating student motivation as a mediator so that educational

institutes in Iraq could ensure that their students are performing well in their academics as they are motivated toward the learning process with AI tools.

H2: Student motivation significantly mediates the relationship between AI tools and student performance.

2.4. Mediating Role of Student Engagement

The researcher in the current research believes that student engagement is a crucial component to enhancing the nexus between AI tools and student performance. In addition, research has elaborated that in higher educational institutes, student engagement is the key construct to enhance students' learning outcomes to achieve academic success (Plak, van Klaveren, & Cornelisz, 2023). Furthermore, the students engaged in their studies are prone to give the best learning outcomes. However, this student engagement could be enhanced if they are provided with AI tools that will provide their support during learning processes, and this support improves their engagement and interest in their academics, thus resulting in exceptional performance, which is the novelty of the undertaken study.

When considering AI tools, it has been observed that they are beneficial for enhancing student engagement, specifically the Chatbot, as they are responsible for providing an immediate solution for the students' problems by communicating with them verbally. Moreover, the capability of such communication tools to provide instant feedback, guidance, and support enhances the engagement of students toward learning processes and academics (Patel, Yadav, & Gaurav, 2022), eventually boosting their performance in their educational careers. In addition, during the presence of Chatbots in classes, students are not hesitant to ask questions and clarify their queries because they believe they will not be judged, improving their engagement with their classes (Yadav, Kaushik, & Sharma, 2021). In addition, using such AI tools in educational institutes has developed the interest and enthusiasm of students within their academics, an ultimatum for enhancing student performance. The same is the case with Chat GPT, where students can easily clarify their questions, but Chat GPT cannot answer verbally. Therefore, the researcher in the current study has highlighted the significance of student engagement within educational institutes as a necessary construct to improve student performance with the help of AI tools.

In addition, the AI-driven environment and tools empower the students by providing them with personal support and immediate feedback, which is key to leveraging their motivation and engagement (Yılmaz & Yılmaz, 2022a). Conclusively, it can be illustrated that a higher engagement level of students is achieved in educational institutes in the presence of AI tools, which significantly improves their academic performance. The educational institutes in Iraq should strive to incorporate AI tools to engage their students and ultimately boost their performance.

H3: The nexus between AI tools and student performance is significantly mediated by student engagement.

3. Methodology

3.1. Research Method

A quantitative research approach is utilized in this paper as the purpose of this method is to formulate predictions, discover facts, and evaluate the existing hypothesis (Williams, 2021). The aim of this study is to examine the impact of AI tools on the overall performance of students. In this accordance, aligning with the quantitative method, a conceptual model has been drawn in the section of the literature review, which indicates the associations among variables as the quantitative method uses an inductive approach that begins with particular observations and then detects the pattern in data to formulate hypotheses (Soiferman, 2010). Thus, following the inductive approach, relevant hypotheses have been formulated to test. The quantitative method is suitable for this study due to the objective nature of the study.

3.2. Data collection

Using the quantitative methodology, this study uses the research instrument of a survey. A survey technique is utilized to gather information from a group of people by asking them questions related to the research phenomenon and analyzing results on the basis of the answers gained (McCombes, 2019). The survey is an efficient technique for quantitative studies as they provide a high level of general capability and assist the data collection from a higher number of respondents (Sincero, 2012). To conduct a

survey, a targeted population refers to an entire group from which a conclusion is being drawn, and samples are utilized, which refers to a specific group from which data is gathered (Bhandhari, 2020). The population of this study is universities in Iraq, and data is collected from students studying in the respective universities. To get efficient samples, a probability sampling technique is utilized that assists the selection of samples on the basis of principles of randomization (Jamil, 2018).

Following the quantitative method to conduct a survey, a questionnaire was developed for this study. The questionnaire asks relevant questions to respondents as per the subject matter of the study. The literature review help in the identification of significant questions related to selected variables and the formulation of the questionnaire related to them. The design of the questionnaire comprises two sections in which Section 1 presents the demographics of respondents, while Section 2 consists of questions related to the variables of the study. The measurement items have been gained from previous empirical studies. The measurement items were initially tested for their reliability and validity and then distributed to respondents. The reliability tests of measurement scales have been done by experts, which efficiently understand the selected variables.

The comprehensive details of measurement items are discussed below:

- **AI-tools**

The scale of AI tools is developed by Celik (2023); originally, the scale comprises 37 items that deal with AI in pedagogy as well. However, due to the relevance of this study, the five items of 'interaction with AI' has been utilized in this paper.

- **Student Motivation**

The scale of student motivation is developed by Hamoud, Hashim, and Awadh (2018), which comprises six items.

- **Student Engagement**

The scale of student engagement has been adopted from studies of Zhoc et al. (2019), from which four items of Peer engagement are used in this paper.

- **Student Performance**

Student performance was based on the six-item scale designed by Wilson, Lizzio, and Ramsden (1997) and was recently used by Gopal, Singh, and Aggarwal (2021), who adapted the scale for online student performance. However, in the present study, the scale was adapted in the context of AI tools and their benefit to student performance.

After the reliability test, a questionnaire was revised and edited. A five-point Likert scale is used to determine the answers of the respondents. The level of the Likert scale follows Level 1-Strongly diasgree1, Level 2- Disagree, level 3- Neutral, Level 4- Agree, and Level 5- Strongly Agree. After editing, the final draft of the questionnaire was distributed to the students in a selected sample of universities in Iraq. Before sending the survey questionnaire, a consent form has also been sent to authorities and participants to record their approval of participation. The filled questionnaire was collected in 4 weeks; initially, 500 responses were recorded from which 312 efficient responses were finalized for analysis.

3.3. Data Analysis

For the analysis of this study, statistical and descriptive tools were utilized. For descriptive statistics, SPSS was utilized. SPSS is appropriate for this study as it follows efficient data management, offers reliable results, and has less chance of errors.

4. Results

4.1. Data normality

The data were initially screened to remove any outliers present in the data in the form of low and high values by using a frequency test. Test results indicated no outliers existing in the data. Then, the missing values were traced and incorporated into a suitable value based on the trends of the other responses. The normality of the data was analyzed by using skewness and kurtosis test on the data, and the computed values were compared with a pre-defined standard range of the value of skewness, which is -1.96 to +1.96, and the calculated values of the data were all inside the threshold range, and it proved the normality of the data. While the mean value of the

data represents the trends of the responses, and it must be three or above for the agreement of the respondents towards the positive side, and the computed mean of the collected data for this study variables was above 3 for all the variables, indicating the positive agreement of the targeted population about the addressed concepts.

Table 4.1: Descriptive analysis

Descriptive Statistics							
	N	Minimum	Maximum	Mean	Std. Deviation	Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
AI	312	1.00	5.00	3.5224	1.03744	-.511	.275
SE	312	1.00	5.00	3.4928	1.10016	-.634	.275
SM	312	1.33	5.17	3.4829	.89412	-.806	.275
STP	312	1.00	5.00	3.2821	1.12519	-.786	.275
Valid N (listwise)	312						

4.2. kmo and bartlett's test

The KMO test has been conducted to check the suitability of the collected data and the appropriateness of the targeted sample of the population for the study, and if its calculated value is above 0.8 or close to 1, the targeted sample size is declared best fit for the overall model of the study. The KMO test's value of this study was .912, which crossed the minimum range for the sufficiency of the sample size to address this study's results. The Bartletts test highlights the abundance of the collected data for the study and justifies the concepts of the designed model on the large population, and its significance reflects the redundancy of data, and the significance value of the Bartletts test of this study was .000, and it has revealed the significant amount of data for the study.

Table 4.2: Results of KMO and Bartlett's Test.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.912
Bartlett's Test of Sphericity	Approx. Chi-Square	4356.268
	df	190
	Sig.	.000

4.3.The factor loading matrix

The factor loading matrix has been calculated by performing the factor loading analysis to evaluate the factor loading of the items of the constructs. The standard value for the accuracy of the factor loading was considered 0.6. The following table has represented the factor scores of all of the items, no value came below the standard limit, and it has proved the correlation of the selected items of every variable with their own construct.

Table 4.3: Factor scores of the items.

Rotated Component Matrix[a]				
	Component			
	1	2	3	4
AI1	.720			
AI2	.745			
AI3	.791			
AI4	.765			
AI5	.639			
SE1				.671
SE2				.663
SE3				.719
SE4				.725
SM1			.806	
SM2			.861	
SM3			.845	
SM4			.835	
SM5			.868	
STP1		.730		
STP2		.731		
STP3		.809		
STP4		.747		
STP5		.684		

4.4.The reliability of the data

While using SPSS, the researcher has calculated the reliability of the data by using the reliability analysis and has provided the reliability of the construct items for the calculations of further results of this study. The reliability analysis has provided the Cronbach alpha value for every variable signalling its reliability for the model of this study. The Cronbach alpha value has been designated as an efficient tool for

assessing the reliability of the items, and it has a threshold range of above 0.7 or close to 1 for an excellent value of reliability. The following table presents the Cronbach alpha values of all variables and magnifies the items' reliability for the constructs.

Table 4.4: The Cronbach alpha values of the variables.

VARIABLE	ITEMS	α
AI	5	.893
SE	4	.886
SM	6	.796
STP	6	.895

4.5. The hierarchal regression model for hypotheses testing

The hypothesis acceptance decision was made on the output of the hierarchal regression model, an analysis used to calculate the dependence of one variable on the other. The regression model analysis has been conducted in two steps; in the first step, the direct impact of the independent variable AI tools on the student's performance has been estimated, and the model summary has provided the regression value as the adjusted R square .477 with the significance of .000 and the degree of variance was 55.9%. Thus, the significance value and the degree of variance have shown the green signal for the acceptance of the first hypothesis.

Table 4.5: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. The error in the Estimate
1	.691[a]	.477	.476	.81487

a. Predictors: (Constant), AI

Table 4.6: ANOVA Results

ANOVA[a]						
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	187.897	1	187.897	282.974	.000[b]
	Residual	205.842	310	.664		
	Total	393.739	311			

a. Dependent Variable: STP

b. Predictors: (Constant), AI

For the mediators, the regression value for the student engagement was .325*** with high significance and the acceptance of the hypothesis of mediation of student engagement; the second mediation impact of student motivation has gained a beta value of .259**, with two-star significance, so the hypothesis of the mediation of student motivation has also been accepted. As per the degree of change and the increase in the influence of all the variables was concerned, the mediation of two variables has a 7.9% role in the student's performance in the high schools. The following tables contain the regression values, their significance, and the degree of variance in the student performance, the dependent variable.

Table 4.7: Regression Analysis

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.643	.164		3.932	.000
	AI	.749	.045	.691	16.822	.000
			M1β		**M2β**	
	INDEP					
	AI		.749**		.348***	
	R^2		.477			
	MED					
	SE				.325***	
	SM				.259***	
	R^2				.556	
	ΔR^2				.079	

5. Discussion and Conclusion

The current study has focused on determining artificial intelligence tools' influence on students' performance in Iraq, where student motivation and student engagement will significantly act as mediators. The researcher believes that educational institutes should incorporate artificial intelligence tools such as Chat GPT or Chatbot and many other tools because it will provide personal support to the

students, and if they are supported well in their academic career, they will be able to perform extraordinarily in their academic career which is a source of ensuring their bright future. The research findings of the relationship between the chosen constructs have also highlighted whether artificial intelligence tools are crucial for enhancing student performance within the education institutes of Iraq.

The above-cited literature has formulated the evidence for the conceptual framework of the current investigation regarding the direct impact of artificial intelligence tools on students' performance and the mediating role of student motivation and student engagement between artificial intelligence tools and students' performance. Moving toward the discussions of the research findings regarding the proposed hypotheses as described below:

According to the first hypothesis, *"artificial intelligence tools significantly and positively influence student performance"*. The research findings for the direct influence of AI tools on students' performance showed that it significantly influences the students' performance which shows that this hypothesis has been accepted. The acceptance of this hypothesis is based on the co-efficient value, which has not exceeded the threshold value and highlights the positive and significant nexus between artificial intelligence tools and students' performance. According to research, AI and the tools or programs designed based on technological innovations have been incorporated into various educational institutes (Kumar, 2019). However, the current research has utilized AI tools to enhance the academic performance of students, which signifies that the educational institutes of Iraq should prefer to utilize AI tools for enhancing their students' performance.

The second hypothesis states that *"student motivation significantly mediates the relationship between AI tools and student performance"*. Moving toward the research interpretations for the second hypothesis according to which student motivation is a significant mediator between AI tools and the performance of students. The research findings highlight that student motivation significantly mediates the relationship between artificial intelligence tools and the performance of students, thus leading to the acceptance of the proposed hypothesis. This could be evidenced by research based on self-regulated learning, where it has been determined that artificial intelligence and the

tools based on artificial intelligence, such as chatbots, are crucial for enhancing students' motivation within educational institutes (Xia et al., 2023). However, the current study has utilized student motivation from a perspective of a mediator, and the researcher believes that if students are motivated toward the usage of artificial intelligence tools, they would effectively participate in their educational activities as it will be a source of personal support for them, which is the novelty of this research.

According to the third hypothesis, *"the nexus between AI tools and student performance is significantly mediated by student engagement"*. After applying the tests and analysis techniques for testing the validity and significance of the proposed hypothesis, it was found that the obtained value highlights the significance of student engagement as a mediator between artificial intelligence tools and the performance of students, thus leading to the acceptance of the proposed hypothesis. Research has elaborated that technological learning plays a significant role in enhancing the learning capabilities of students in the presence of student engagement in higher educational institutes in India (Panigrahi, Srivastava, & Panigrahi, 2021). However, the present investigation has focused on the mediating role of student engagement between artificial intelligence tools and student performance within the context of Iraq, which signifies the innovation of the present study. Moreover, it is also necessary for the educational institutes of Iraq to implement artificial intelligence tools within their educational institutions because it will engage the students toward learning because they think that the artificial intelligence tools will not judge their caliber and answer them about whatever they want to learn, which will eventually enhance their academic performance within the educational institutions. Conclusively, the research findings of the current research have elaborated that artificial intelligence is a crucial aspect that should be introduced within the educational institutes of Iraq because it enables the students to achieve personal support resulting in improving their motivation and engagement toward their academic activities and they actively participate in their educational activities, which straightens the path of the students toward their successful and exceptional academic career and strengthens their future.

5.1. Research Implications

The present investigation has crucial theoretical and practical implications. From the theoretical perspective, the study has been utilized effectively to expand the existing literature regarding the influence of artificial intelligence tools and students' performance. Additionally, it has been observed that the previous literature has not found the influence of artificial intelligence tools on student performance in the presence of student motivation and student engagement as mediators, which signifies the theoretical aspect of the current research. Furthermore, this study has also efficiently contributed to utilizing the *"Unified Theory of Acceptance and Use of Technology"* for supporting the nexus between AI tools and student performance, were student engagement and motivation act as significant mediators.

Practically, the findings of the present study will be useful for educational institutions to understand the necessity of artificial intelligence tools such as Chat GPT and Chatbot within their institutions because this will be responsible for enhancing the motivation and engagement of students toward their academics. In addition, it will motivate educational institutions in Iraq and other countries to incorporate artificial intelligence tools for providing personal support to their students, elevating their motivation and engagement toward academics, an ultimatum to achieve exceptional student performance throughout their academic careers.

5.2. Limitations

Although the present study has several practical and theoretical implications, it still has some shortcomings, which will provide a way for future researchers to conduct their studies. The following are the limitations of this research:

- The study has some methodological limitations because the researcher has used quantitative methodology. Future researchers could modify their research framework in this regard and pursue it by using qualitative methodology.
- In addition, the researcher in the present investigation has focused on a single country context for determining the impact of artificial intelligence tools on the performance of students, i.e., Iraq. In the future, the investigators could

determine the impact of AI tools on student performance within the context of miscellaneous countries.

- Another shortcoming is based on the research framework where the present study has focused on a mediation model. In the future, it could be modified by formulating a moderated-mediation model.

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