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Role of Artificial Intelligence in Enhancing Academic Performance of Undergraduate Business Students in Kathmandu Valley

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Abstract

This study examines the role of artificial intelligence in enhancing academic performance of undergraduate business students in Kathmandu valley. The dependent variable is student academic performance. The independent variables are attitude towards AI, access to resources, time saving, affordability, and ease of use. The study is based on primary data with 128 observations. To achieve the purpose of the study, structured questionnaire is prepared. The correlation coefficients and regression models are estimated to test the significance and importance of different factors influencing role of artificial intelligence in enhancing academic performance of undergraduate business students in Kathmandu valley.

The study shows that attitude towards AI is positively correlated to student's academic performance. It indicates that a better attitude toward AI leads to increase in student's academic performance. Likewise, access to resources is positively correlated to student's academic performance. It indicates that access to proper resources leads to increase in student's academic performance. Similarly, time saving is positively correlated to student's academic performance. It indicates that more time saved leads to enhancing student's academic performance. Affordability is positively correlated to student's academic performance. It indicates that higher affordability of AI tools leads to enhancement of students' academic performance. Likewise, ease of use is positively correlated to student's academic performance. It indicates that increase in use of AI leads to increase the enhancement of student's academic performance.

Keywords: student academic performance, attitude towards AI, access to resources, time saving, affordability, ease of use

1. Introduction

Wang & Fu (2021) defined AI as the branch of computer science that includes natural language processing, intelligent processing and professional methods. One definition of artificial intelligence (AI) is computers ability to perform cognitive tasks that are normally associated with human thinking in particular in problem solving and teaching (Chen, 2022). In the meantime, AI learning systems can provide learning guidance and required auxiliary materials based on the learners' environment (Liu *et al.,* 2019). Even though AI can make the world a better place, AI comes with its own issues (Siau, 2018).

Chatterjee *et al.* (2021) described Artificial Intelligence (AI) is one such tool helping everything to advance faster than ever before. Likewise, Subrahmanyam & Swathi (2018) highlighted how AI has helped to improve the infrastructure of the health and the education sectors. Similarly, llkka (2018) claimed that the use of AI in education may generate insights on how learning happens, and it can change the way learning is assessed. Dignum (2021)

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argued that artificial intelligence (AI) is considered to provide an essential contribution to ensure the inclusive and cohesive societies and resilient economies that are expected to arise from this digital transformation.

Russell *et al*. (2017) defined that AI as a computer system that can achieve a particular task through certain capabilities (like speech or vision) and intelligent behavior that was once considered unique to humans. Further, Luckin & Holmes (2016) stated that AI as computer systems that have been designed to interact with the world through capabilities (for example, visual perception and speech recognition) and intelligent behaviors (for example, assessing the available information and then taking the most sensible action to achieve a stated goal) that we would think of as essentially human.

Moreno (2019) stated that AI can be defined as a modelling science that is used in investigating, developing and applying formalized models that has salient aspects relevant to learning and instruction. Likewise, the adaptive learning environment adapts teaching learning approaches and materials based on the capabilities and requirements of the individual learners (Kumar, 2019). Bećirović *et al.* (2023) argued that the integration of AI into educational contexts. AI plays a pivotal role in enhancing student satisfaction, resolving academic challenges, and ensuring achievement of academic and professional career (Assiri *et al.,* 2020). Similarly, D'Mello & Graesser (2012) found that students who used AI-powered tools to learn English scored significantly higher on standardized tests than students who did not use these tools.

Al-Waqfi (2015) investigated the absence of positive attitudes among learners towards mathematics and their low level of education led to a difficult formation in the way of their learning, causing them to suffer some problems in dealing with this subject, which made them face a real problem and a significant challenge. Besides, Sabir *et al.* (2022) examined the impact of student wellness on academic performance with mediating role of learning environment. Likewise, Abeywickrama & Sachinthanee (2022) found that personality traits, such as conscientiousness and time spent had a positive impact on academic motivation and performance.

Dorina Kabakchieva (2013) stated that it will be used for analyzing the further steps and directions for the university data mining project implementation, including possible transformations of the dataset, tuning the classification algorithms' parameters, etc., in order to achieve more accurate results and to extract more important knowledge from the available data. Hanaysha *et al.* (2023) defined that AI helps students learn more effectively and improve their academic performance through personalized learning, which is tailored to individual needs.

Renz *et al.* (2020) argued that the innovative potential of using AI-based elements in education already exists. AI tools are used to help develop adaptive learning systems that adjust the difficulty level of assignments and assessments based on the individual needs and abilities of each student, providing a personalized learning experience, which would also allow educators to accurately assess the learning achievements of individual student (Alqahtani *et al.,* 2023). Nick Zacharis (2016) found that the most powerful predictors of course outcome were the numbers of messages posted by the students and the contributions they made in team content creation projects.

Vygotsky (1978) explained that human learning is not only a cognitive process but also a socio-cultural process: cognition and learning are situated in social and cultural contexts, and learning is socially mediated by knowledgeable others. In addition, Wang *et al.* (2021) stated the never-ending advantages of AI have drawn the attention of education researchers and motivated them to incorporate various tools of AI into the education of today's world so that massive improvements can be achieved in terms of not only students' performance but also to various other dimensions of educational settings as well.

Coufano (2022) investigated that AI-driven intelligent tutoring systems can offer students individualized feedback, direction, and support as well as help them choose which subject, they need more help in. AI in education creates new opportunities, potentials, and challenges in educational practices (Ouyang & Jiao, 2021). AI in education focuses on making significant advances in educational techniques through real-world trials and the development of standard modular prototypes in statistical reasoning, data visualization, and learning analytics (Alam, 2021).

Pagano *et al*. (2021) stated that one way that universities can maximize the potential of AI is by actively defining its usage and scope. By doing so, higher education institutions can evaluate the risks and rewards of AI and determine how it can best support students' needs (Chen *et al.*, 2022). Likewise, Alam (2021) claimed that AI can potentially revolutionize education for international students, it is important to acknowledge the associated risks and limitations.

Sánchez-Prieto *et al*. (2017) explained that aside from improving the user interface for using AI technologies, some studies have pointed out that teachers' confidence and ability of using AI technologies could affect their willingness of incorporating AI technologies into their learning designs. Whitehill *et al.* (2015) found that AI-Aided Online Learning Model can also be determined what the student likes or dislikes, and moreover, when a particular student is losing interest in a topic taught, or when he or she is likely to quit a course.

Shahiri *et al.* (2015) stated that not only are students' academic performance improved by the applications of AI, but applications of AI help students to build their overall personality too. Popenici and Kerr (2017) argued that IT as computing systems that can engage in similar processes to the human ones, such as learning, adapting, synthesizing, self-correcting and using data for complex processing tasks. Furthermore, AI excels at specific tasks and changes almost every sector of a country's economy by allowing computers to make sound decisions that lead to more efficient operations (Dong *et al*., 2020).

In the context of Nepal, Gurung and KC (2023) defined that Artificial Intelligence (AI), a cross- disciplinary filed in computer science and engineering, aims to create intelligent computers that can mimic human cognitive abilities like learning, reasoning, perception and problem- solving. Likewise, Rimal *et al*. (2021) stated that machine learning model requires many parameters for optimal design and testing of research data classifies data into training and test data sets.

Shankar (2022) defined that artificial intelligence (AI) uses a computer to model intelligent behavior with minimal intervention from humans. In the present day, there is not a single field of work that has not explored the uses of AI (Thapa *et al.,* 2022). Technology

in today's modern world is rapidly improving and is making a huge impact in all sectors of the world (Jha *et al.,* 2022).

Bastola (2019) concluded that the use of (AU) has a positive direct effect on the net benefit (NB) within the public universities in Nepal. Limbu and Sah (2019) found that use of unsupervised machine learning algorithms provides high accuracy in predicting academic performance. Karki and Karki (2017) argued that the significance of adopting a well-round strategy where in an artificial intelligence serves to enhance the responsibilities of educators rather than replace them.

AI has impacted on education, business, and many vital sectors which also affect student's academic performance (Thapa *et al*., 2022). Similarly, Mainali (2020) claimed that AI is increasingly being used in different fields of human activity and is a vital component of the fourth industrial revolution on human brain architecture. There is a non-linear relationship between input and output using algorithms.

The above discussion shows that empirical evidences vary greatly across the studies on the role of artificial intelligence in enhancing academic performance of undergraduate business students in Kathmandu valley. Though there are above mentioned empirical evidences in the context of other countries and in Nepal, no such findings using more recent data exist in the context of Nepal. Therefore, in order to support one view or the other, this study has been conducted.

The major objective of this study is to role of artificial intelligence in enhancing academic performance of undergraduate business students in Kathmandu valley. Specifically, it examines the relationship of attitude towards AI, access to resources, affordability, time saving, ease of use, and student academic performance of undergraduate business students in Kathmandu valley.

The remainder of this study is organized as follows: section two describes the sample, data, and methodology. Section three presents the empirical results and final section draws the conclusion.

2. Methodological aspects

The study is based on the primary data. The data were gathered from 128 respondents through questionnaire. The study employed convenience sampling method. The respondents' views were collected on attitude towards AI, access to resources, time saving, affordability, ease of use in Kathmandu. This study is based on descriptive as well as causal comparative research designs.

The model

The model tries to find out the role of artificial intelligence in enhancing academic performance of undergraduate business students in Kathmandu valley. The dependent variable selected for the study is student academic performance. Similarly, the selected independent variables are attitude towards AI, access to resources, time saving, affordability, ease of use. Therefore, the model takes the following form:

$$SAP = \beta_0 + \beta_1 AT + \beta_2 ATR + \beta_3 TS + \beta_4 AF + \beta_5 EOU + e$$

Where,

SAP= Student's Academic performance

AT= Attitude towards AI

ATR= Access to resources

TS= Time Saving

AF= Affordability

EOU= Ease of use

Attitude towards AI was measured using a 5-point Likert scale where respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "AI technology is incorporating into my academic performance." "AI is a valuable tools for improving academic performance." and so on.The reliability of the items was measured by computing the Cronbach's alpha (α =0.896).

Access to resources were measured using a 5-point Likert scale where the respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "AI-powered resources readily available in my college library.", "I have encountered difficulties in accessing AI resources for academic purposes." and so on. The reliability of the items was measured by computing the Cronbach's alpha (α = 0.905).

Time saving was measured using a 5-point Likert scale where the respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "Using AI tools allows me to complete academic tasks more efficiently.", "AI technologies help me manage my study time more effectively.'' and so on. The reliability of the items was measured by computing the Cronbach's alpha (α = 0.906).

Affordability was measured using a 5-point Likert scale where the respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "AI-powered educational resources are reasonably priced.", "The cost of accessing AI technologies is justified by the benefits it brings to my academic performance.' and so on. The reliability of the items was measured by computing the Cronbach's alpha (α = 0.894).

Ease of use was measured using a 5-point Likert scale where the respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "AI tools are user-friendly and easy for me to navigate.", "Learning to use AI technologies is straightforward and intuitive." and so on. The reliability of the items was measured by computing the Cronbach's alpha (α = 0.837).

Student's academic performance was measured using a 5-point Likert scale where the respondents were asked to indicate the responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items and sample items include "My academic grades have significantly improved since integrating AI technologies into my learning process.", "I feel

more confident in my understanding of course materials and concepts due to the use of AI tools.'' and so on. The reliability of the items was measured by computing the Cronbach's alpha ($\alpha = 0.861$).

The following section describes the independent variables used in this study along with the hypothesis formulation.

Attitude towards AI

Al-Waqfi (2015) investigated the absence of positive attitudes among learners towards AI and their low level of education led to a difficult formation in the way of their learning, causing them to suffer some problems in dealing with this subject, which made them face a real problem and a significant challenge. Attitude towards AI plays a pivotal role in enhancing student satisfaction, resolving academic challenges, and ensuring achievement of academic and professional career (Assiri *et al.,* 2020). Textbooks can be digitalized using AI technologies and digital learning interfaces can be configured throughout the educational system (Chrisinger, 2019). Morozevich (2022) found that student-centeredness is still at the core of contemporary education, and even with the powerful help of AI technology. Based on it, this study develops the following hypothesis

H_1: There is a positive relationship between attitude towards AI and student academic performance.

Access to resources

Turner (2017) found that easy access to resources has the positive impact on the students' performances. Wilson (2018) concluded that easy access to educational materials have the positive and significant impact on the students' academic performances. Similarly, Lewis (2016) found that easy access to internet resources have significantly impact the students' academic performances. Similarly, Johnson (2017) examined the easy access to educational technology and student performance. The study concluded that easy access to technology have positive impact on the students' academic performances. Further, Deng *et al.* (2020) proposed that easy access to resources can include textbooks, online learning platforms, libraries, educational technology, study materials, tutoring services and more. The study revealed that there is a positive impact of easy to resources with the student's academic performance. Furthermore, Mitchell (2018) examined the open educational resources and academic achievement in higher education. The study revealed that easy access to open resources has the positive impact on the students' academic performances. In additional, Brown (2016) concluded that easy access to library resources have positive impact on the students' academic performances. Based on it, the study develops the following hypothesis:

H_2: There is a positive relationship between access to resources and student academic performance.

Time saving

The time students spend interacting with AI-powered educational software, virtual tutors, automated grading systems or other AI-driven resources that are designed to enhance their learning and support their academic progress (Roll *et al.,* 2016). Abeywickrama & Sachinthanee (2022) examined the impact of McCrae's big five personality traits on academic

motivation of part-time employed undergraduates. The study found that personality traits, such as conscientiousness and time spent had a positive impact on academic motivation and performance. Similarly, Liu (2022) examined the relationship between students' study time and academic performance and its practical significance. The study concluded that there is a positive relationship between study time and academic performance, particularly for students with low performance. In additional, Mir & Shakeel (2019) found that increased time spent on smartphones or laptops was negatively correlated with academic performance. Further, Sharma *et al.* (2022) found that as the time devoted to studying increased, academic accomplishment also increased. Based on it, the study develops the following hypothesis:

H_3: There is a positive relationship between time saving and student academic performance.

Affordability

D'Mello & Graesser (2012) found that students who used AI-powered tools to learn English scored significantly higher on standardized tests than students who did not use these tools. Webber (1973) stated that education is a wicked problem: it is open-ended and ill-defined, and it has multiple goals such as accessibility, affordability, achievability, and quality. Coufano (2022) investigated that AI-driven intelligent tutoring systems can offer students individualized feedback, direction, and support as well as help them choose which subject, they need more help in. Based on it, this study develops the following hypothesis:

H_4: There is a positive relationship between student academic performance and affordability

Ease of use

Various AI tools such as recommendation systems and educational gaming apps help the learner in a much better scope, and make education easy and interesting for all (Yadav *et al.,* 2016). Sánchez-Prieto *et al*. (2017) explained that aside from improving the user interface for using AI technologies, some studies have pointed out that teachers' confidence and ability of using AI technologies could affect their willingness of incorporating AI technologies into their learning designs. Whitehill *et al.* (2015) found that AI-Aided Online Learning Model can also be determined what the student likes or dislikes, and moreover, when a particular student is losing interest in a topic taught, or when he or she is likely to quit a course. Shahiri *et al.* (2015) stated that not only are students' academic performance improved by the applications of AI, but applications of AI help students to build their overall personality too. Based on it, this study develops the following hypothesis:

H_5: There is a positive relationship between ease of use and student academic performance.

3. Results and discussion

Correlation analysis

On analysis of data, correlation analysis has been undertaken first and for this purpose, Kendall's Tau correlation coefficients along with mean and standard deviation has been computed and the results are presented in Table 1.

Table 1

Kendall's Tau correlation coefficients matrix

This table presents Kendall's Tau coefficients between dependent and independent variables. The correlation coefficients are based on 128 observations. The dependent variable is SAP (Student's academic performance). The independent variables are AT (attitude towards AI), ATR (access to resources), TS (time saving), AF (affordability), EOU (ease of use).

Variables	Mean	S. D	SAP	AT	ATR	TS	AF	EOU
SAP	2.001	0.587	1					
AT	2.032	0.727	0.353**	1				
ATR	1.896	0.639	0.438**	0.378**	1			
TS	1.960	0.588	0.379**	0.362**	0.497**	1		
AF	2.090	0.739	0.493**	0.318**	0.510**	0.438**	1	
EOU	1.738	0.707	0.314**	0.169**	0.266**	0.234**	0.242**	1

Note: The asterisk signs (**) and (*) indicate that the results are significant at one percent and five percent levels respectively.

Table 1 reveals that that attitude towards AI is positively correlated to student's academic performance. It indicates that a better attitude toward AI leads to increase in student's academic performance. Likewise, access to resources is positively correlated to student's academic performance. It indicates that access to proper resources leads to increase in student's academic performance. Similarly, time saving is positively correlated to student's academic performance. It indicates that more time saved leads to enhancing student's academic performance. Affordability is positively correlated to student's academic performance. It indicates that higher affordability of AI tools leads to enhancement of students' academic performance. Likewise, ease of use is positively correlated to student's academic performance. It indicates that increase in use of AI leads to increase the enhancement of student's academic performance.

Regression analysis

Having indicated the Kendall's Tau correlation coefficients, the regression analysis has been carried out and the results are presented in Table 2. More specifically, it shows the regression result of attitude towards AI, access to resources, time saving, affordability, and ease of use on student's academic performance of undergraduate business students in Kathmandu valley.

Table 2

Estimated regression result of attitude towards AI, access to resources, time saving, affordability, and ease of use on student's academic performance of undergraduate business students in Kathmandu valley

Estimated regression result of attitude towards AI, access to resources, time saving, affordability, and ease of use on student's academic performance. The results are based on 128 observations using linear regression model. The model is SAP = β0 + + β1 AT + β2 ATR + β3 TS + β4 AF + β5 EOU where the dependent variable is SAP (Student's academic performance). The independent variables are AT (attitude towards AI), ATR (access to resources), TS (time saving), AF (affordability), EOU (ease of use).

Model	Intercept	Regression coefficients of					Adj. R_bar^2	SEE	F-value
		AT	ATR	TS	AF	EOU			
1	1.104 (5.913) **	0.349 (4.232)**					0.360	0.660	17.91
2	1.401 (6.297)**		0.186 (2.115)**				0.193	0.692	4.470
3	1.207 (5.994)**			0.328 (3.368)**			0.292	0.675	11.343
4	1.215 (5.376)**				0.328 (3.368)**		0.261	0.683	8.590
5	1.316 (6.917)**					0.253 (2.981)**	0.260	0.682	8.888
6	1.049 (4.495)**	0.333 (3.607)**	0.037 (0.396)**				0.113	0.668	8.976
7	0.920 (3.886)**	0.266 (2.621) **		0.126 (0.956)	0.328 (3.368)**		0.123	0.664	6.636
8	0.937 (3.690)**	0.270 (2.604)**	0.020 (0.192)**	0.133 (0.97)	0.061 (0.42)		0.114	0.663	4.943
9	0.937 (3.659)**	0.270 (2.393)**	0.020 (0.190)**	0.134 (0.936)	0.061 (0.42)	0.002 (0.020)	0.110	0.668	3.917

Notes:

i. Figures in parenthesis are t-values.
ii. The asterisk signs (**) and (*) indicate that the results are significant at one percent and five percent level respectively.
iii. Student's academic performance is dependent variable.

The regression result shows that the beta coefficients of attitude toward AI are positive with student's academic performance. This indicates that attitude toward AI has positive impact in student's academic performance. This finding is consistent with the findings of Wilson (2018). Similarly, the beta coefficients of access to resources are positive with student's academic performance. This indicates that access to resources has positive impact on student's academic performance. This finding is consistent with the findings of Liu (2022). The beta coefficients of time saving are positive with student's academic performance. This indicates that time saving has positive impact on student's academic performance. This finding is consistent with the findings of Sabir *et al.* (2022). Likewise, the beta coefficients of affordability are positive student's academic performance. This indicates that affordability has positive impact on student's academic performance. This finding is consistent with the findings of Coufano (2022). Additionally, the beta coefficients of ease of use are positive with student's academic performance. This indicates that ease of use have positive impact on student's academic performance. This finding is consistent with the findings of Shahiri *et al.* (2015)

4. Summary and conclusion

Artificial intelligence in education (AIEd) has become one of the current emerging fields of novel educational technology. AI technologies overcome the limitations of space and time; with the portability of mobile devices, learners can read the materials, practice and collect information at any time. In the meantime, AI learning systems can provide learning guidance and required auxiliary materials based on the learners' environment.

This study attempts to examine the role of Artificial Intelligence in Enhancing Academic Performance of Undergraduate business Students in Kathmandu Valley. The study is based on primary data of 128 respondents.

The study showed that of attitude towards AI, access to resources, time saving, affordability, and ease of use have positive impact on student's academic performance. The study also concludes that attitude towards AI followed by time saving and affordability are the most influencing factors that enhance academic performance of undergraduate business students in Kathmandu valley.

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