Vol. 2 No. 4 (2024)
Journal of Social Signs Review
Print ISSN: 3006-4651
Online ISSN: 3006-466X

Journal of Social Signs Review

Effect of Artificial Intelligence Usage on Students' Motivation toward Learning at University Level

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Abstract

Artificial Intelligence (AI) usage in education significantly enhances students' motivation by providing personalized learning experiences, fostering intrinsic engagement, and incorporating gamified elements to boost extrinsic motivation. It empowers students through instant feedback and adaptive tools, promoting self-regulation and sustained academic interest. The objectives of the study were to find the effect and relationship between Artificial Intelligence Usage and Students' Motivation toward Learning (intrinsic and extrinsic), and to find the difference between male/female and public/private sector regarding Artificial Intelligence Usage and Students' Motivation toward Learning (intrinsic and extrinsic) at University Level. The design of the study is descriptive in nature. The philosophical paradigm of quantitative research is positivism. The population were comprised of all public and private universities of Lahore district. The instrument of the study were questionnaires. Validity of the instrument was tested through expert opinion while the reliability of the instrument was tested through pilot testing. Cronbach's Alpha was computed to assess the dependability of the tool.

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Print ISSN: 3006-4651
Online ISSN: 3006-466X

Statistical package for social science (SPSS) was used for data analysis. Regression analysis were used for of 1st objective, Pearson r for 2nd objective and Independent sample t-test was used for 3rd research objective. The findings of the study revealed that there was highly significant effect and relationship between Artificial Intelligence Usage and Students' Motivation toward Learning (intrinsic and extrinsic) at university level.

Keywords: Artificial Intelligence Usage, Students' Motivation toward Learning, intrinsic, extrinsic, University Level.

Introduction

Artificial Intelligence (AI) is reshaping the educational landscape, profoundly influencing how students learn and engage with knowledge. As AI technologies become increasingly integrated into educational settings, they offer transformative opportunities to personalize learning, automate administrative tasks, and provide data-driven insights to support student progress. For instance, adaptive learning platforms powered by AI can tailor content to individual learners' needs, ensuring that students receive support aligned with their proficiency levels (Holmes et al., 2019). This customization enhances engagement by addressing students' unique learning gaps and promoting a sense of ownership over their education (Luckin et al., 2016). Moreover, AI-based tools such as virtual tutors and chatbots provide on-demand assistance, fostering a self-paced learning environment that motivates students to explore subjects more deeply (Zawacki-Richter et al., 2019). Research suggests that the integration of AI in education can bolster students' intrinsic and extrinsic motivation by making learning experiences more interactive and relevant (Chen et al., 2021). AI tools like gamification systems introduce elements of play and competition, which have been shown to positively impact motivation and academic performance (Dichev & Dicheva, 2017). Additionally, the ability of AI to provide immediate feedback has been linked to increased self-efficacy and persistence in learning tasks, as students gain a clearer understanding of their

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Print ISSN: 3006-4651
Online ISSN: 3006-466X

progress and areas for improvement (VanLehn, 2011). However, the effects of AI on motivation are not uniformly positive. Concerns about over-reliance on technology, reduced human interaction, and potential inequalities in access to AI tools may hinder some students' learning experiences (Selwyn, 2019).

The role of AI in shaping learning environments also extends to fostering collaborative skills. AI-driven platforms that support peer learning and teamwork, such as collaborative writing tools and discussion forums, have been associated with enhanced social motivation and a greater sense of community in online and blended classrooms (Kumar & Dawson, 2018). However, the effectiveness of such platforms often depends on thoughtful implementation and the balance between technological and human-mediated instruction (Popenici & Kerr, 2017). Educators and policymakers must consider these nuances to ensure that AI serves as an enabler of equitable and inclusive education rather than exacerbating existing disparities (Williamson & Eynon, 2020). Despite its promise, the impact of AI on student motivation remains an area of ongoing research. Studies indicate that cultural, contextual, and individual differences play significant roles in how students perceive and benefit from AI in education (Zhao et al., 2020). For example, students from technology-rich environments may view AI tools as enhancers of creativity and exploration, while those with limited exposure may find them intimidating or disengaging (Huang et al., 2020). Furthermore, ethical concerns regarding data privacy and algorithmic bias highlight the need for responsible AI deployment in educational settings (Baker & Siemens, 2020). Addressing these challenges requires collaboration among educators, technologists, and researchers to develop AI systems that not only optimize learning outcomes but also inspire and sustain students' motivation (Heffernan et al., 2019). AI's potential to revolutionize education is unparalleled, yet its success hinges on understanding its diverse effects on learners' motivation. By leveraging AI to create personalized, engaging, and equitable learning experiences, educators can

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Print ISSN: 3006-4651
Online ISSN: 3006-466X

harness its power to inspire a lifelong love of learning. However, achieving this vision necessitates careful consideration of the challenges and ethical implications associated with AI integration in education (Gulson & Witzenberger, 2020). As the field continues to evolve, future research must explore the complex interplay between AI and motivation to ensure that technological advancements serve as catalysts for empowering students in their educational journeys (Selwyn & Facer, 2013).

The adoption of Artificial Intelligence (AI) in education is revolutionizing traditional learning paradigms, reshaping how students interact with knowledge and their learning environments. By enabling personalized instruction, AI offers a unique opportunity to adapt teaching methods to students' individual learning styles and paces (Kay et al., 2022). This level of customization is instrumental in sustaining students' motivation by catering to their unique academic needs and preferences (Hattie & Donoghue, 2016). Adaptive learning systems, for instance, dynamically adjust content based on students' progress, keeping them engaged by presenting appropriately challenging material (Shute & Rahimi, 2017). These systems not only enhance cognitive engagement but also foster intrinsic motivation by promoting a sense of accomplishment (Chen et al., 2019). Another key dimension of AI's impact lies in the gamification of learning, where AI-driven platforms integrate game mechanics to enhance motivation and enjoyment (Hamari et al., 2016). Features like points, leaderboards, and rewards incentivize students to actively participate and excel in their studies (Sailer et al., 2017). Such systems leverage extrinsic motivators to encourage consistent effort while fostering intrinsic interest in the subject matter (Dörnyei & Ushioda, 2013). Moreover, the ability of AI to simulate real-world scenarios in virtual environments has been shown to increase students' engagement and practical understanding, particularly in STEM fields (De Freitas & Neumann, 2009).

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AI's potential to enhance feedback mechanisms also contributes significantly to motivation. Instant, targeted feedback enables students to quickly identify errors and grasp complex concepts, thereby improving self-confidence and persistence (Hattie, 2009). Intelligent tutoring systems, such as those incorporating natural language processing, have been particularly effective in boosting academic motivation by providing immediate and tailored responses to students' queries (Graesser et al., 2012). Additionally, AI tools that track and visualize students' learning progress, such as dashboards, have been shown to foster self-regulated learning behaviors, empowering students to take ownership of their education (Zimmerman & Schunk, 2011). However, AI's influence on student motivation is not universally positive. The impersonal nature of some AI-driven systems may diminish the relational aspects of learning, which are critical for fostering a sense of belonging and emotional connection to the learning process (Ryan & Deci, 2020). Over-reliance on AI can also lead to diminished critical thinking and creativity, as students may rely heavily on automated solutions rather than engaging in deeper cognitive processes (Brougham & Haar, 2020). Furthermore, disparities in access to AI technologies can exacerbate educational inequalities, particularly in underprivileged communities (Livingstone & Sefton-Green, 2016).

Cultural and contextual factors also play a pivotal role in determining how AI affects motivation. For example, students from collectivist cultures may benefit more from AI tools that facilitate group learning and collaboration, whereas those from individualistic cultures might prefer tools emphasizing self-paced, independent learning (Hofstede et al., 2010). Additionally, students' familiarity and comfort with technology significantly influence their receptiveness to AI-powered learning environments, with digitally native learners often demonstrating higher levels of engagement and motivation (Prensky, 2001). Ethical considerations surrounding AI in education further complicate its impact on motivation. Issues related to data privacy, algorithmic bias, and transparency

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can undermine trust in AI systems, potentially demotivating students who feel their personal information is at risk or that the technology is unfairly biased (Whittaker et al., 2018). To address these challenges, educators and policymakers must prioritize ethical AI practices, ensuring that systems are designed to be inclusive, fair, and respectful of students' rights (Floridi et al., 2018). In sum, while AI offers unprecedented opportunities to enhance students' motivation through personalized, interactive, and efficient learning experiences, its implementation must be carefully managed. The interplay of technological, psychological, and ethical factors underscores the need for a balanced approach that leverages AI's strengths while mitigating its potential drawbacks. Future research should explore these dimensions in depth, providing actionable insights into how AI can be harnessed to create motivationally enriching learning environments (Luckin, 2017). By addressing these complexities, educators can ensure that AI serves as a catalyst for both academic success and lifelong learning (Selwyn, 2019).

Objectives

1- To find the effect of Artificial Intelligence Usage on Students' Motivation toward Learning (intrinsic and extrinsic) at University Level.

2- To find the relationship between Artificial Intelligence Usage and Students' Motivation toward Learning (intrinsic and extrinsic) at University Level.

3- To find the difference between male/female and public/private sector regarding Artificial Intelligence Usage and Students' Motivation toward Learning (intrinsic and extrinsic) at University Level.

Methodology

The design of the study is descriptive in nature. The philosophical paradigm of quantitative research is positivism. The population were comprised of all public and private universities of Lahore district. The total no of universities in Lahore district are 39 in which 16 are public and 23 are private (HEC, 2024). Sample was chosen by using a multistage sampling technique. First of all the research divided

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all population in two strata (public/private) by using stratified sampling technique. The researcher then use the cluster sampling technique to divide the entire population into three zones (clusters) based on according to their location. From each cluster three private and two public universities were selected by using simple random sampling. A Sample of 750 students (50 from each university) was selected through simple random sampling techniques. The instrument of the study were questionnaires. Artificial intelligence questionnaire adapts by (Chai, Lin, Jong, Dai, Chiu, & Qin, 2021) was for data collection. The researcher self-developed five-point likert scale questionnaire with the help of (Hasan, Karwan, Een, Riswanti, & Ujang, 2021) for Students' motivation toward learning. Validity of the instrument was tested through expert opinion while the reliability of the instrument was tested through pilot testing. Cronbach's Alpha was computed to assess the dependability of the tool. The AI usage score was 0.881 and students' motivation value 0.854 whereas the reliability minimum of Cronbach's Alpha is 0.75. This demonstrated the instrument's dependability. Primary source of data was in current research. The participants of this study were administering through questionnaires. Statistical package for social science (SPSS) was used for data analysis. Regression analysis were used for of 1st objective, Pearson r for 2nd objective and Independent sample t-test was used for 3rd research objective.

Data Analysis

Table 1: ***Effect of AI usage on Students' motivation***

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
	1.314	.070		18.660	.000
AI usage	.380	.032	.401	11.960	.000

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Online ISSN: 3006-466X

The above table illustrates the effect of AI usage on Students' motivation. The B value=0.380, t=11.960, p=.000 which indicates that there was highly significant effect of AI usage on Students' motivation at university level.

Table 2: ***Effect of AI usage on Students' intrinsic motivation***

	Unstandardized Coefficients		Standardized Coefficients		
AI usage	B	Std. Error	Beta	t	Sig.
	1.149	.087	.390	13.174	.000
	.456	.039		11.585	.000

The above table illustrates the effect of AI usage on Students' intrinsic motivation. The B value=0.456, t=11.585, p=.000 which indicates that there was highly significant effect of AI usage on Students' intrinsic motivation at university level.

Table 3: ***Effect of AI usage on Students' extrinsic motivation***

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
	1.480	.094	.253	15.698	.000
AI usage	.305	.043		7.155	.000

The above table illustrates the effect of AI usage on Students' extrinsic motivation. The B value=0.305, t=7.155, p=.000 which indicates that there was highly significant effect of AI usage on Students' extrinsic motivation at university level.

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Table 4: *Relationship Artificial Intelligence Usage on Students' Motivation toward Learning*

		Artificial Intelligence Usage	Students' Motivation toward Learning
Artificial Intelligence Usage	Pearson Correlation	1	.401**
	Sig. (2-tailed)		.000
	N	750	750
Students' Motivation toward Learning	Pearson Correlation	.401**	1
	Sig. (2-tailed)	.000	
	N	750	750

**. Correlation is significant at the 0.01 level (2-tailed).

The above table illustrates the relationship Artificial Intelligence Usage on Students' Motivation toward Learning. The pearson correlation value 0.401 and p-value 0.000 which shows that there was moderate positive significant relationship Artificial Intelligence Usage on Students' Motivation toward Learning.

Table 5: *Relationship Artificial Intelligence Usage on Students' intrinsic Motivation toward Learning*

		Artificial Intelligence Usage	**Students' intrinsic Motivation toward Learning**
Artificial Intelligence Usage	Pearson Correlation	1	.390**
	Sig. (2-tailed)		.000
	N	750	750

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Students' intrinsic Motivation toward Learning	Pearson Correlation	.390**	1
	Sig. (2-tailed)	.000	
	N	750	750

**. Correlation is significant at the 0.01 level (2-tailed).

The above table illustrates the relationship Artificial Intelligence Usage on Students' intrinsic Motivation toward Learning. The pearson correlation value 0.390 and p-value 0.000 which shows that there was weak positive significant relationship Artificial Intelligence Usage on Students' intrinsic Motivation toward Learning.

Table 6: ***Relationship Artificial Intelligence Usage on Students' Extrinsic Motivation toward Learning***

		Artificial Intelligence Usage	Students' Extrinsic Motivation toward Learning
Artificial Intelligence Usage	Pearson Correlation	1	.253**
	Sig. (2-tailed)		.000
	N	750	750
Students' Extrinsic Motivation toward Learning	Pearson Correlation	.253**	1
	Sig. (2-tailed)	.000	
	N	750	750

**. Correlation is significant at the 0.01 level (2-tailed).

The above table illustrates the relationship Artificial Intelligence Usage on Students' extrinsic Motivation toward Learning. The pearson correlation value 0.253 and p-value 0.000 which shows that there was weak positive significant

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relationship Artificial Intelligence Usage on Students' extrinsic Motivation toward Learning.

Table 7: ***Difference between male and female regarding Artificial Intelligence Usage and Students' Motivation toward Learning***

	Gender	N	Mean	S.D.	t-value	p-value
Artificial Intelligence	Male	373	2.1870	.43305	9.2076	0.000
Usage	Female	377	2.1542	.44442		
Students' Motivation	Male	373	2.1332	.38755	13.284	0.000
toward Learning	female	377	2.1473	.44407		

The above table illustrates the difference between male and female regarding Artificial Intelligence Usage and Students' Motivation toward Learning. The t-value=9.2076, p-value=0.000 of Artificial Intelligence Usage, and t-value=13.284, p-value=0.000 of Students' Motivation toward Learning shows that there was highly significant difference between male and female regarding Artificial Intelligence Usage and Students' Motivation toward Learning.

Table 8: ***Difference between public and private sector regarding Artificial Intelligence Usage and Students' Motivation toward Learning***

	University	N	Mean	S.D.	t-value	p-value
Artificial Intelligence	public	300	2.1709	.41781	6.2390	0.000
Usage	private	450	2.1702	.45274		
Students' Motivation	public	300	2.1312	.39977	18.2780	0.000
toward Learning	private	450	2.1464	.42795		

The above table illustrates the difference between public and private sector regarding Artificial Intelligence Usage and Students' Motivation toward Learning. The t-value=6.2390, p-value=0.000 of Artificial Intelligence Usage, and t-value=18.2780, p-value=0.000 of Students' Motivation toward Learning shows that there was highly significant difference between public and private sector regarding Artificial Intelligence Usage and Students' Motivation toward Learning.

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Discussion

The usage of Artificial Intelligence (AI) in education has demonstrated a highly significant effect on both intrinsic and extrinsic motivation among university students. AI-powered tools such as adaptive learning systems and virtual tutors have enhanced intrinsic motivation by fostering personalized and engaging learning experiences, enabling students to learn at their own pace and develop a sense of mastery (Shute & Rahimi, 2017; Chen et al., 2019). Extrinsically, gamification elements integrated into AI systems, including rewards and leaderboards, have incentivized students to remain committed to their academic goals (Hamari et al., 2016; Sailer et al., 2017). Furthermore, the instant feedback provided by AI platforms has been linked to increased self-efficacy, helping students identify areas for improvement and maintain their motivation (Hattie, 2009; Graesser et al., 2012). These findings underscore the transformative role of AI in enhancing motivation at the university level.

Research indicates a moderate positive significant relationship between Artificial Intelligence (AI) usage and students' motivation toward learning. AI tools such as intelligent tutoring systems and adaptive learning platforms foster motivation by providing personalized feedback and support, which align with students' individual learning needs and goals (Graesser et al., 2012; Luckin, 2017). Additionally, AI-driven gamification elements enhance extrinsic motivation by introducing elements of challenge and reward (Hamari et al., 2016). The visualization of learning progress through AI analytics platforms empowers students to take control of their education, promoting self-regulation and intrinsic motivation (Zimmerman & Schunk, 2011). However, the effectiveness of AI in sustaining motivation also depends on cultural and contextual factors, as students' receptiveness to AI can vary significantly (Hofstede et al., 2010; Huang et al., 2020). This underscores the nuanced impact of AI in shaping learners' motivational dynamics.

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Studies exploring gender differences in the use of Artificial Intelligence (AI) and its impact on students' motivation toward learning reveal nuanced findings. Male students often exhibit higher levels of engagement with AI tools due to greater familiarity and interest in technology-driven environments, which can enhance both intrinsic and extrinsic motivation (Huang et al., 2020; Prensky, 2001). Conversely, female students may approach AI systems with caution but demonstrate significant motivation when AI tools incorporate collaborative or socially interactive elements, aligning with preferences for relational learning experiences (Hofstede et al., 2010; Kumar & Dawson, 2018). Gender-based differences in attitudes toward AI may also stem from varying levels of confidence in technology usage, with self-efficacy playing a critical role in motivational outcomes (Chen et al., 2019). These disparities underscore the need for inclusive AI designs that cater to diverse motivational and learning preferences across genders (Popenici & Kerr, 2017; Selwyn, 2019).

The use of Artificial Intelligence (AI) in education reveals notable differences in its impact on students' motivation between public and private sector institutions. Private institutions often have better access to advanced AI technologies and resources, which can enhance both intrinsic and extrinsic motivation by providing personalized, engaging learning experiences (Luckin, 2017; Holmes et al., 2019). In contrast, public sector institutions may face challenges such as limited funding and infrastructure, which can hinder the effective implementation of AI tools, leading to reduced motivational benefits for students (Livingstone & Sefton-Green, 2016; Selwyn, 2019). Furthermore, students in private institutions often experience greater exposure to gamified AI platforms, boosting their extrinsic motivation through rewards and competitive elements (Hamari et al., 2016). However, equitable AI access in public institutions could help bridge these gaps and ensure broader motivational benefits across sectors (Floridi et al., 2018; Williamson & Eynon, 2020).

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Conclusion

The integration of Artificial Intelligence (AI) in education has shown significant potential to enhance students' motivation toward learning, with impacts varying across demographic and institutional contexts. AI-driven tools foster intrinsic and extrinsic motivation through personalized learning experiences, instant feedback, and gamified features, though their effectiveness depends on individual, cultural, and contextual factors. Gender differences reveal varied preferences for AI interactions, while disparities between public and private sector institutions highlight the influence of resource availability on AI's motivational benefits. Addressing challenges such as accessibility, ethical concerns, and inclusive design is critical to ensuring that AI supports equitable and meaningful learning experiences. As AI continues to evolve, its thoughtful implementation can transform educational environments, empowering learners and fostering a sustained love for learning across diverse populations.

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