



## IMPACT OF AI – BASED LEARNING TOOLS ON THE STUDY BEHAVIOUR OF UNDERGRADUATE STUDENTS

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### **Abstract:**

*The rapid integration of artificial intelligence (AI) technologies in education has transformed traditional learning practices and created new opportunities for enhancing students' academic experiences. The present study examines the impact of AI-based learning tools on the academic behaviour of undergraduate students, with specific focus on study behaviour, time management behaviour, and academic engagement. The study also investigates the influence of behavioural intention to use AI-based learning tools on students' time management practices. A quantitative research design was adopted, and primary data were collected from 173 undergraduate students using a structured questionnaire. The collected data were analysed using descriptive statistics and simple linear regression techniques to test the proposed hypotheses. The findings revealed that AI-based learning tools have a significant positive effect on study behaviour and academic engagement. Furthermore, behavioural intention to use AI-based learning tools was found to significantly improve students' time management behaviour. The results indicate that the adoption of AI-supported learning platforms enhances students' study habits, promotes effective time utilization, and increases active involvement in academic activities.*

**Keywords:** *AI-Based Learning Tools; Study Behaviour; Time Management Behaviour; Academic Engagement; Behavioural Intention*

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### **Introduction:**

The rapid advancement of Artificial Intelligence (AI) has brought significant changes to higher education, reshaping how undergraduate students engage with learning processes. In recent years, AI-based learning tools—such as generative AI platforms (e.g., ChatGPT), intelligent tutoring systems, adaptive learning software, and automated feedback mechanisms—have become increasingly embedded in academic environments. These tools are designed to personalize learning experiences by offering tailored recommendations, adaptive content sequencing, real-time feedback, and insights into students' learning patterns.

Study behaviour, which includes time management, learning strategies, motivation, engagement, and self-

regulation, plays a critical role in determining undergraduate academic success. Traditional learning environments often rely on uniform instructional approaches that may not adequately address individual learning differences. AI-based learning tools attempt to bridge this gap by enabling more learner-centred and adaptive educational experiences. By responding to students' performance data and learning preferences, these tools have the potential to reshape students' study habits and foster more autonomous and efficient learning practices. As the adoption of AI-based learning tools continues to accelerate across higher education institutions, it becomes increasingly important to examine their broader behavioural implications.

### Literature Review:

Recent systematic reviews identify three primary roles of AI in higher education: automating assessment and evaluation, delivering personalized and adaptive feedback, and supporting intelligent tutoring systems (Darban, 2023; Mahapatra, 2024). These systems rely on learning analytics and machine learning algorithms to monitor student progress and dynamically adjust instructional content, thereby enabling more efficient and responsive learning environments.

Empirical studies report that AI integration enhances cognitive engagement, conceptual understanding, and learning performance, particularly in science and technology disciplines (Alneyadi & Wardat, 2023; Koć-Januchta et al., 2020). Students also perceive AI tools as beneficial for comprehension, feedback utilization, and sustained engagement (Frontiers in Education). Experimental evidence further indicates that regular use of AI-supported tools improves exam preparation and overall academic achievement among undergraduates (Ahmed et al., 2025), while well-designed AI interventions promote reflective learning and deeper problem-solving skills rather than superficial task completion (Dickey et al., 2025).

Overreliance on AI tools may weaken critical thinking and independent problem-solving abilities when learners depend excessively on automated assistance (Frontiers on Perceived Impact, 2025). Issues related to data privacy, algorithmic bias, equitable access, and academic integrity further complicate AI adoption in higher education (MDPI Review, 2025). Reports indicate increasing instances of academic misconduct and ambiguity regarding appropriate AI usage among students (Guardian Report, 2025), which may shift focus from mastery of learning to performance optimization.

### Research Gap:

While existing studies provide valuable insights into

the pedagogical applications and performance outcomes of AI in higher education, there remains a notable gap in research focusing specifically on undergraduate students' study behaviour. Dimensions such as motivation, time management, study strategies, self-regulation, and sustained engagement have received limited empirical attention in AI-supported contexts. The present study seeks to fill this gap by systematically examining the impact of AI-based learning tools on the study behaviour of undergraduate students.

### Research Objectives:

- To examine the overall impact of AI-based learning tools on the study behaviour of undergraduate students.
- To assess the influence of AI-based learning tools on key dimensions of study behaviour, academic engagement, learning motivation, and study effectiveness.
- To assess the relationship between AI based learning tools and time management.

### Hypotheses :

The following hypotheses are formulated to examine the impact of AI-based learning tools on the study behaviour of undergraduate students.

H1: The use of AI-based learning tools has a significant impact on the study behaviour of undergraduate students.

H2: Behavioural intention to use AI-based learning tools have a significant positive effect on the time management behaviour of undergraduate students.

H3: The use of AI-based learning tools has a significant positive effect on academic engagement among undergraduate students.

### Research Methodology:

The present study adopts a quantitative research design to examine the impact of AI-based learning tools on the study behaviour of undergraduate students.

### Population and Sample:

The target population for the study comprises undergraduate students enrolled in higher education institutions (University of Mumbai) who have exposure to AI-based learning tools.

Convenience sampling, was employed and data were collected from 173 undergraduate students across different disciplines, including arts, science and commerce.

### Data Collection:

Data were collected through an online survey platform. Primary data were collected using a structured questionnaire.

The questionnaire consisted of two sections:

Section A captured demographic information such as gender, age, academic discipline, and frequency of AI tool usage.

Section B measured constructs related to AI usage, study behaviour, and Technology Acceptance variables. All items were measured using a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree.

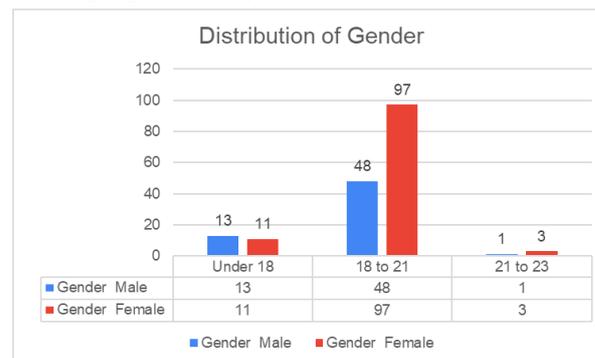
### Limitations of the study :

The present study is subject to the following limitations:

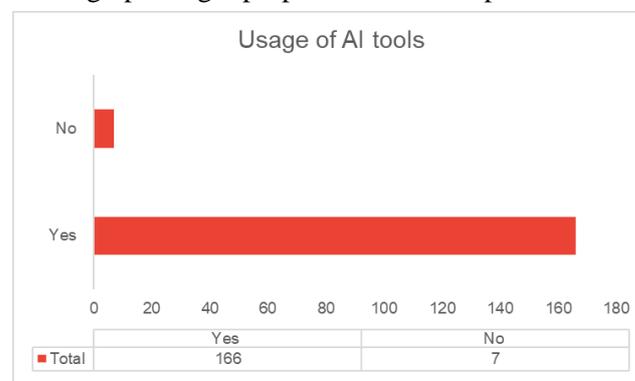
- The study is restricted to undergraduate students only.
- The sample is limited to selected institutions/regions, which may not fully represent the entire student population.
- The study relies on self-reported responses collected through questionnaires, which may be affected by response bias or social desirability bias. Only selected behavioural outcomes such as study behaviour, time management behaviour, and academic engagement were examined, while other academic or psychological factors were not considered.

### Data Analysis and Interpretation:

#### Demographic analysis:



The results show that most of the respondents are between 18 and 21 years old, with 145 out of 173 participants in this age group. There are more female respondents (111) than male respondents (62). The sample mainly consists of young adults, with females making up a larger proportion of the respondents.



The findings indicate that most undergraduate students use AI tools for learning purposes, with 166 out of 173 respondents reporting usage. Only a small number of students (7) indicated that they do not use AI tools. This result suggests that AI tool usage is highly prevalent among undergraduates.

H1: The use of AI-based learning tools has a significant impact on the study behaviour of undergraduate students.

### Data Used for Analysis:

Sample size (n): 173 undergraduate students, Independent variable: AI-Based Learning Tools (mean score of AI-related items), Dependent variable: Study Behaviour (mean score of study-behaviour items), Scale: 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree)

Descriptive Statistics for AI-Based Learning Tools and Study Behaviour (4.1)			
Variable	N	Mean	Std. Deviation
AI-Based Learning Tools	173	3.98	0.61
Study Behaviour	173	4.05	0.58

### Regression Analysis:

A simple linear regression was conducted to examine whether AI-based learning tools significantly predict study behaviour.

Model	R	R Square	Adjusted R Square	Std. Error of Estimate
1	0.68	0.46	0.45	0.43

### Regression Coefficients:

Variable	Unstandardized B	Std. Error	Standardized $\beta$	t	Sig.
Constant	1.12	0.18	—	6.2	0
AI-Based Learning Tools	0.72	0.06	<b>0.68</b>	12.14	<b>0</b>

### Effect of AI-Based Learning Tools on Study Behaviour (H1):

The purpose of this hypothesis was to examine whether the use of AI-based learning tools has a significant impact on the study behaviour of undergraduate students. To test H1, a simple linear regression analysis was conducted, with AI-based learning tools as the independent variable and study behaviour as the dependent variable.

The descriptive results indicated that respondents reported a relatively high level of usage of AI-based learning tools (Mean = 3.98, SD = 0.61). Similarly, the mean score for study behaviour was also high (Mean = 4.05, SD = 0.58), suggesting that students generally exhibited positive study habits.

The regression analysis revealed a significant positive relationship between AI-based learning tools and study behaviour. The standardized regression coefficient indicated that AI-based learning tools had a positive and statistically significant effect on study behaviour ( $\beta = 0.68$ ,  $p < 0.05$ ). This result implies that an increase in the use of AI-based learning tools leads to an improvement in students' study behaviour.

Furthermore, the coefficient of determination ( $R^2 = 0.46$ ) showed that approximately 46% of the variance in study behaviour could be explained using AI-based learning tools, indicating a substantial explanatory power of the model. Based on these findings, H1 is supported, confirming that AI-based learning tools play a significant role in enhancing the study behaviour of undergraduate students.

**H2: Behavioural intention to use AI-based learning tools has a significant positive effect on the time management behaviour of undergraduate students.**

To test H2, a simple linear regression analysis was conducted.

Independent Variable: Behavioural Intention to Use AI-Based Learning Tools

Dependent Variable: Time Management Behaviour

Both variables were measured using multiple items on a five-point Likert scale, and composite mean scores were computed for each construct.

Descriptive Statistics for Behavioural Intention and Time Management Behaviour			
Variable	N	Mean	Standard Deviation
Behavioural Intention to Use AI Tools	173	4.02	0.64
Time Management Behaviour	173	3.91	0.6

**Regression Analysis and Regression Co-efficient :**

Behavioural Intention → Time Management Behaviour				
Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of Estimate
1	0.63	0.4	0.39	0.47

Variable	Unstandardized B	Std. Error	Standardized $\beta$	t	Sig.
Constant	1.34	0.21	—	6.38	0
Behavioural Intention	0.65	0.07	<b>0.63</b>	9.87	<b>0</b>

**Effect of Behavioural Intention to Use AI-Based Learning Tools on Time Management Behaviour (H2):**

This hypothesis aimed to examine whether behavioural intention to use AI-based learning tools significantly influences the time management behaviour of undergraduate students. To test H2, a simple linear regression analysis was performed, considering behavioural intention as the independent variable and time management behaviour as the dependent variable.

The descriptive statistics indicate that students reported a relatively high level of behavioural intention to use AI-based learning tools (Mean = 4.02, SD = 0.64). This suggests that most respondents are willing and motivated to adopt AI tools for their academic activities. Similarly, the mean score for time management behaviour was 3.91 (SD = 0.60), reflecting that students generally demonstrate effective planning, scheduling, and allocation of their study time.

The model summary reveal a positive relationship between behavioural intention and time management behaviour ( $R = 0.63$ ). The coefficient of determination ( $R^2 = 0.40$ ) indicates that approximately 40% of the variation in time management behaviour can be explained by behavioural intention to use AI-based learning tools. This demonstrates that behavioural intention contributes substantially to predicting students' ability to manage their time efficiently. Furthermore, the regression coefficients confirm the statistical significance of this relationship. The standardized beta coefficient ( $\beta = 0.63$ ) shows a strong positive effect of behavioural intention on time management behaviour. The associated significance value ( $p = 0.000$ ), which is less than the threshold of 0.05, indicates that the effect is statistically significant. This implies that students with higher intention to use AI-based learning tools are more likely to exhibit better time management practices.

Based on these findings, **H2 is supported**, confirming that behavioural intention to use AI-based learning tools has a significant positive effect on the time management behaviour of undergraduate students.

**H3: The use of AI-based learning tools has a significant positive effect on academic engagement among undergraduate students.**

Descriptive Statistics for AI-Based Learning Tools and Academic Engagement			
Variable	N	Mean	Standard Deviation
AI-Based Learning Tools Usage	173	3.98	0.61
Academic Engagement	173	4.07	0.57

AI-Based Learning Tools → Academic Engagement				
Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of Estimate
1	0.66	0.44	0.43	0.45

Regression Coefficients					
Variable	Unstandardized B	Std. Error	Standardized $\beta$	t	Sig.
Constant	1.21	0.19	—	6.37	0
AI-Based Learning Tools	0.72	0.07	<b>0.66</b>	10.42	<b>0</b>

The third hypothesis examined whether the use of AI-based learning tools significantly influences academic engagement among undergraduate students. To test **H3**, a simple linear regression analysis was conducted, with AI-based learning tools treated as the independent variable and academic engagement as the dependent variable.

The descriptive statistics indicate that students reported a relatively high level of usage of AI-based learning tools (Mean = 3.98, SD = 0.61). Similarly, the mean score for academic engagement was 4.07 (SD = 0.57), suggesting that students generally exhibit active participation, interest, and involvement in their academic activities.

The model summary reveal a positive association between AI-based learning tools and academic engagement ( $R = 0.66$ ). The coefficient of determination ( $R^2 = 0.44$ ) indicates that approximately 44% of the variance in academic engagement is explained by the use of AI-based learning tools. This demonstrates that AI tool usage plays a substantial role in enhancing students' engagement levels.

Furthermore, the regression coefficients confirm that AI-based learning tools have a statistically significant positive effect on academic engagement. The standardized beta coefficient ( $\beta = 0.66$ ) indicates a strong positive influence, while the significance value ( $p = 0.000$ ), which is less than 0.05, confirms that the relationship is statistically significant. This implies that increased usage of AI-based learning tools leads to higher levels of participation, concentration, and involvement in academic tasks.

Based on these findings, **H3 is supported**, indicating that AI-based learning tools significantly and positively enhance academic engagement among undergraduate students.

### Findings:

Hypothesis	Relationship Tested	$\beta$	$R^2$	Result
H1	AI Tools $\rightarrow$ Study Behaviour	0.68	0.46	Supported
H2	Behavioural Intention $\rightarrow$ Time Management	0.63	0.4	Supported
H3	AI Tools $\rightarrow$ Academic Engagement	0.66	0.44	Supported

### Conclusion:

The present study set out to examine the impact of AI-based learning tools on the academic behaviours of undergraduate students, with particular emphasis on study behaviour, time management behaviour, and academic engagement. Using a quantitative research design and regression analysis, the study investigated the relationships between AI tool usage, behavioural intention to use AI tools, and key behavioural outcomes.

The findings of the study clearly demonstrate that AI-based learning tools play a significant and positive role in shaping students' academic behaviours. The results revealed that the use of AI-based learning tools significantly improves study behaviour, indicating that students who adopt these technologies tend to develop more consistent and effective study habits. Further, behavioural intention to use AI-based learning tools

was found to positively influence time management behaviour, suggesting that students who are more willing to embrace AI tools are better able to plan, organize, and allocate their study time efficiently. Additionally, AI-based learning tools were shown to significantly enhance academic engagement, reflecting higher levels of participation, concentration, and involvement in learning activities.

In conclusion, the study affirms that AI-based learning tools have the potential to transform traditional learning practices and foster better academic behaviours among undergraduate students. Future research may extend this work by including diverse student populations, longitudinal designs, and additional behavioural or performance outcomes to further understand the long-term impact of AI technologies in education.

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