

To analyze the Student's Usage of the Artificial Intelligence Tool in their Learning

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ABSTRACT

To effectively analyze student usage of AI tools in learning, research should focus on understanding the specific AI tools used, their frequency of use, purpose to use. This study analyses the students' use of the Artificial Intelligence tool in their learning. Using simple random sampling. Primary data of 153 participants were collected using a questionnaire method via Google Forms. The research employed a mixed-methods approach, integrating both quantitative and qualitative data collection methods. The questionnaire consists of four sections namely, A: Demographic Information, B: AI Usage in Education, C: Perceived Impact of AI on Academic Development, D: Open-Ended Questions. Altogether there were 14 questions, categorized into four sections. Section A consists of 4 demographics, section B consists of four AI usage, section C consists of one question followed by ten sub questions using Likert's scale and Section D consists of five open ended questions. The findings reveal that 71% of the students use artificial intelligence tools for academic activities, the first factor accounts for 64.619% of the variance features from the stated observations. Thus, only one component is effective enough in representing all the characteristics or components highlighted by the stated 10 variables and probably 90 % of the students use AI tool to solve academic problems.

Keywords

Artificial Intelligence, Likert scale, Principle component Analysis, proportion test, text (thematic) analysis etc.

1. INTRODUCTION

Students learning involves the measurable acquisition of skills, attitudes, and knowledge resulting from participation in educational activities. It encompasses not only the retention of information but also the ability to apply knowledge in various contexts.

Most of the time student use Artificial intelligence tool for acquiring knowledge, skills which will be helpful for gaining information in various academic activities. These activities involved writing assignments, solving problem, learning new thing related to academic etc.

The following are some activities that college students will do as academic work

- Active engagement: for effective leaning students participate in discussing concepts, applying knowledge to real-life scenario and doing experiment so that they can understand some of the concepts. This will help their understanding and retention of knowledge, understanding concepts, and problem-solving [7].
- Experiential learning cycle: according to Davis Kolb's experiential learning cycle theory outlines a four-stage cycle. That is concrete experience, reflective observation, abstract conceptualisation, and active experimentation.

This model helpful in learning through experience and reflection, allowing students to apply theoretical concepts in practical contexts [8].

- Students benefit from developing analytical and self-assessment skill. which will help students to enable to plan, monitor, and evaluate activity and understanding and perform the activity.
- In a Collaborative learning environment, students are engaging with peers and teachers, where students can understand concepts. Social interaction encourages to exchange ideas, critical thinking and the development of communication skills [6], [2].

AI tools are designed to automate, assist, or augment human tasks. They can analyse data, generate content, recognize patterns, and even engage in conversations. By learning from massive datasets, these tools can provide insights, predictions, and solutions across diverse applications.

AI tools become more integrated into education. Students use ChatGPT and other AI tools to enhance learning, improve productivity, and support various academic tasks. Student uses these AI tools for various reasons like

- As a Writing and editing assistance. Which includes drafting essay, reports, and research paper. Proofing grammar and creating sentence structure.
- AI tools also use for summarising academic articles, explaining complex concepts in simple term, generating study guides, helping brainstorm topics [12].
- AI tool also helps in creating study plans, scheduling study sessions, suggesting techniques for focusing and organising.
- AI tools help student debugging and explaining programming code. It also helps in demonstrating how to write code in various programming language [10].
- AI tools help in generating practice questions and quizzes. Explaining answers and solving problem step-by-step. Recommending resources and revision strategies.
- It also helps in translating text and improving writing in various languages. Practising conversion in different languages. Composing professional emails or formatting communication

2. LITERATURE REVIEW

Artificial intelligence (AI) has become progressively utilized in education, commonly known as Artificial Intelligence in Education (AIED). Tools like intelligent tutoring systems,

educational robots, learning analytics dashboards, adaptive learning platforms, and human–computer interactions have shown considerable promise for improving teaching and learning [3] [13] [5].

The three main factors social factor, technology factor and organisation factors are influencing the attitude of students and Artificial Intelligence (AI) has a positive impact on sustainable learning outcome and career growth [9].

An overview of the impact of AI on students learning experience, highlighting its benefits and potential challenges [11], [4].

AI possesses significant potential to improve learning effectiveness and academic outcomes; however, its successful application necessitates tackling issues regarding accuracy, cognitive detachment, and ethical considerations. A balanced strategy is crucial to guarantee fair, efficient, and accountable learning experiences in AI-improved educational settings [1].

This study analyses the usage of artificial intelligence (AI) tool by the students in their learning. Precisely, the research aims to identify factors that are effective in using Artificial Intelligence tools, the proportion of students using an artificial intelligence tool and to analyze the purpose of Artificial Intelligence tool usage.

3. OBJECTIVES

Following are the objectives of this study

Objectives

- To evaluate Artificial Intelligence tool usage across different student demographics.
- To identify factors that are effective in using Artificial Intelligence tools.
- To examine the proportion of students using an artificial Intelligence tool
- To analyse the purpose of Artificial Intelligence tool usage
- To test the hypothesis that 90% of the students use ChatGPT to solve academic problems.

4. MATERIALS AND METHODS

4.1 Data Collection

Primary data were collected using a questionnaire method via Google Forms. This platform was selected due to its intuitive interface and built-in analytical tools, which enabled effective data handling and analysis. The research employed a mixed-methods approach, integrating both quantitative and qualitative data collection methods. The questionnaire consists of four sections namely, A: Demographic Information, B: AI Usage in Education, C: Perceived Impact of AI on Academic Development, D: Open-Ended Questions. Altogether there were 14 questions, categorized into four sections. Section A consists of four demographics, section B consists of four AI usage, section C consists of one question followed by ten sub questions using Likert's scale and Section D consists of five open ended questions.

their various academic activities.

4.2 Sample

A simple random sampling method was used to collect primary data. The sample consisted of 153 students, students selected from all the streams like science, commerce, engineering, pharma, management etc. to get reliable result of AI usage by students learning.

4.3 Analysis

Data analysis is the systematic process of examining, transforming, and modelling data to extract meaningful insights. Initially user is tested for the reliability of the data. Quantitative data were analyzed using diagrammatic approach, including frequency and percentage calculations, to provide a view of usage of AI tools. Principle Component Analysis used to find important variables, and correlation analysis to determine the relationship between variables. Qualitative data is analyzed through text analysis to extract key texts from open-ended survey responses. Researchers used MS Excel, SPSS, and R software to analyze the gathered data.

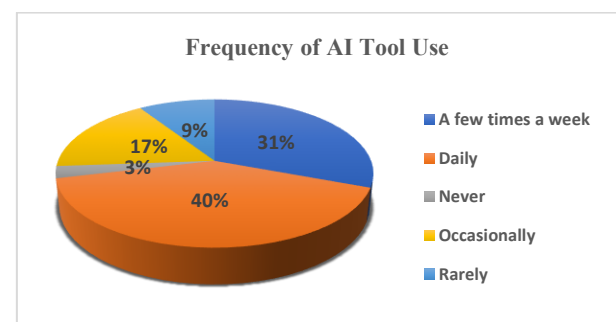


Figure 1. Representation of Frequency of AI Tool Use

The above diagram shows that 71% of the students frequently use artificial intelligence tool for academic activities

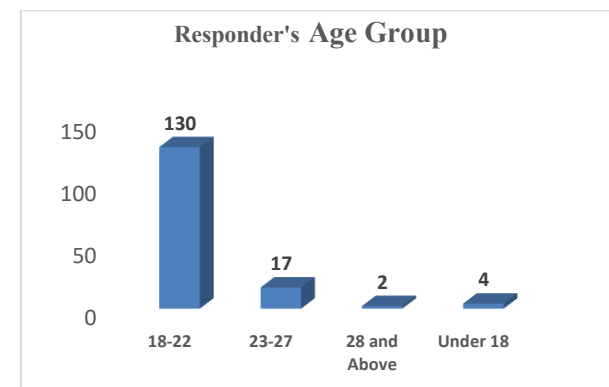


Figure 2. Representation of Age group of Responders

The Above bar diagram represents 85% of the students belong to age group of 18-22 and use artificial intelligence tool for their academic activity.

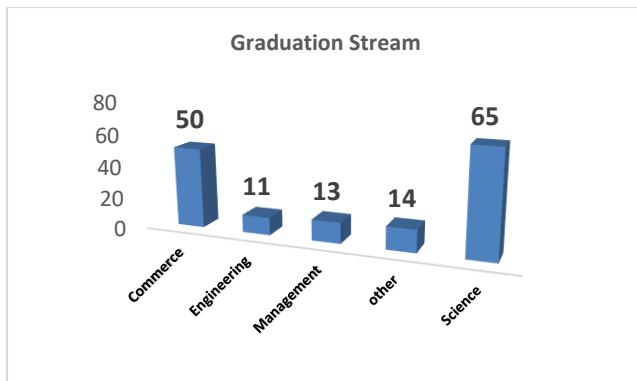


Figure 3. Represents Responders Graduation Stream

The above diagram depicts the streamwise student's distribution in data

Reliability

Data reliability, in simple terms, means how much you can trust that your data is consistent, accurate, and complete over time. It's crucial for making informed decisions, conducting reliable research, and ensuring the integrity of any study or analysis

Table 1. Reliability Statistics Test

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.938	0.938	10

Generally, a Cronbach's Alpha of 0.7 or higher is considered acceptable, with higher values indicating greater consistency and reliability. A value of 0.9 or higher suggests excellent reliability. If the alpha is below 0.7, it may indicate that some items in the scale are not measuring the same construct or that the scale needs to be refined. In this study the value of Cronbach's Alpha is 0.938, it suggests excellent reliability.

Proportion test: A proportion test is a statistical approach utilized to assess whether a sample proportion significantly differs from a proposed population proportion or if there is a meaningful disparity between two sample proportions. Here researchers would like to test,
H0: 90 % of the students use ChatGPT to solve the academic problems that is H0: P= 0.90
against
H1: More than 90 % of the students use AI to solve the academic problems that is H0: P>0.90
The stated hypothesis is tested using R software at 5% level of significance.

R software output:

1-sample proportions test with continuity correction
data: 136 out of 153, null probability 0.9
X-squared = 0.10458, df = 1, p-value = 0.6268
alternative hypothesis: true p is greater than 0.9
95 percent confidence interval:
0.8364347 1.0000000
sample estimates: p 0.8888889
The p-value associated is 0.6268 (>0.05). Hence, it may accept H0 at 5% level of significance. Therefore, it may conclude that 90 % of the students use an AI tool to solve their academic problems.

Table 2. Quantitative data analysis

Item Statistics				
Question No.	Questions	Mean	Std. Deviation	N
Q1	AI tools help me understand difficult academic topics better. [AI tools help me understand hard academic topics better.]	3.82	1.222	153
Q2	AI tools help me understand difficult academic topics better. [I achieve result when I use AI for studying or assignments.]	3.69	1.137	153
Q3	AI tools help me understand difficult academic topics better. [AI helps me learn at my own speed.]	3.59	1.211	153
Q4	AI tools help me understand difficult academic topics better. [AI improves my academic writing skills.]	3.37	1.266	153
Q5	AI tools help me understand difficult academic topics better. [I feel more comfortable when using AI-powered educational tools.]	3.62	1.246	153
Q6	AI tools help me understand difficult academic topics better. [I more dependent on AI for completing academic tasks.]	3.24	1.272	153
Q7	AI tools help me understand difficult academic topics better. [AI tools save me time in doing research and studying.]	3.79	1.201	153
Q8	AI tools help me understand difficult academic topics better. [Using AI my critical thinking and problem-solving skills is improved.]	3.56	1.180	153
Q9	AI tools help me understand difficult academic topics better. [I feel the accuracy of the information provided by AI tools.]	3.44	1.141	153
Q10	AI tools help me understand difficult academic topics better. [AI should be more integrated into our education system.]	3.58	1.195	153

The mean value describes the characteristics of the most common response among the stated dataset. For Q1 average is 3.82 it represents average response for Q1 is approximately 4 and it indicates Looking at the mean values in Table No. 2 above, one can conclude that the 'AI tool help to understand difficult topics better.' is the most important variable that indicates on an average all the respondent agree with AI tool help to understand difficult topics better.

Table 3. KMO measure

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.927
Bartlett's Test of Sphericity	Approx. Chi-Square	1119.052
	Df	45
	Sig.	<.001

The KMO measures the sampling adequacy (which determines if the responses given with the sample are adequate or not) which should be close to 0.5 for satisfactory factor analysis to proceed. Kaiser (1974) recommends 0.5 (value for KMO) as a minimum (barely accepted), values between 0.7-0.8 are acceptable, and values above 0.9 are superb. Looking at the table above, the KMO measure is 0.927, which indicates superb sampling adequacy.

Bartlett's test is another indication of the strength of the relationship among variables. This tests the null hypothesis that the correlation matrix is an identity matrix. An identity matrix is a matrix in which all of the diagonal elements are 1 and all off-diagonal elements are close to 0. From the same table, it can be seen that Bartlett's Test of Sphericity is significant (<0.001). The significance is less than 0.05 that is the significance level is small enough to reject the null hypothesis. This means that the correlation matrix is not an identity matrix.

Table 4. Principal Component Analysis

Communalities		
	Initial	Extraction
AI tools help me understand difficult academic topics better. [AI tools help me understand hard academic topics better.]	1.000	.750
AI tools help me understand difficult academic topics better. [I achieve result when I use AI for studying or assignments.]	1.000	.693
AI tools help me understand difficult academic topics better. [AI helps me learn at my own speed.]	1.000	.706
AI tools help me understand difficult academic topics better. [AI improves my academic writing skills.]	1.000	.565
AI tools help me understand difficult academic topics better. [I feel more comfortable when using AI-powered educational tools.]	1.000	.716
AI tools help me understand difficult academic topics better. [I more dependent on AI for completing academic tasks.]	1.000	.455
AI tools help me understand difficult academic topics better. [AI tools save me time in doing research and studying.]	1.000	.739
AI tools help me understand difficult academic topics better. [Using AI my critical thinking and problem-solving skills is improved.]	1.000	.743

AI tools help me understand difficult academic topics better. [I feel the accuracy of the information provided by AI tools.]	1.000	.501
AI tools help me understand difficult academic topics better. [AI should be more integrated into our education system.]	1.000	.594
Extraction Method: Principal Component Analysis.		

In Table No. 4, communalities show how much of the variance (i.e. the communality value which should be more than 0.5 to be considered for further analysis. Else these variables are to be removed from further steps of factor analysis) in the variables have been accounted for by the extracted factors. For instance, over 75 % of the variance in data is due to "variable 1,7 and 8".

Table 5. Extraction Method: PCA

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.462	64.619	64.619	6.462	64.619	64.619
2	.738	7.377	71.995			
3	.605	6.046	78.042			
4	.569	5.692	83.734			
5	.362	3.624	87.358			
6	.350	3.502	90.860			
7	.297	2.971	93.830			
8	.252	2.522	96.353			
9	.196	1.961	98.313			
10	.169	1.687	100.000			
Extraction Method: Principal Component Analysis.						

The requirement for identifying the number of components or factors stated by selected variables is the presence of eigenvalues of more than 1. Table No.5 shows that for the 1st component the value is 6.462 > 1, and rest of them are < 1. Thus, the stated set of 10 variables with 153 observations represents only one component. Further, the extracted sum of squared holding % of variance depicts that the first factor accounts for 64.619% of the variance features from the stated observations. Thus, only one component is effective enough in representing all the characteristics or components highlighted by the stated 10 variables.

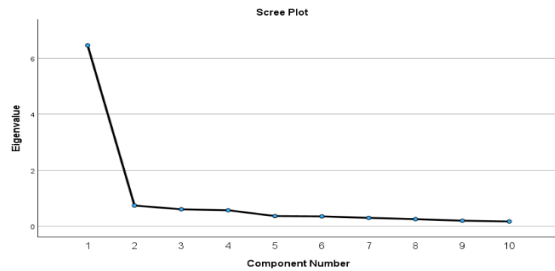


Figure 4. Score plot

The scree plot is a graph of the eigenvalues against all the factors. The graph is useful for determining how many factors to retain. The point of interest is where the curve starts to flatten. It can be seen that the curve begins to flatten between factors 2 and 3, also noted that factor 2 onwards has an eigenvalue of less than 1, so only one factor has been retained.

Text Analysis: Text analysis involves extracting meaningful insights and patterns from unstructured text data.

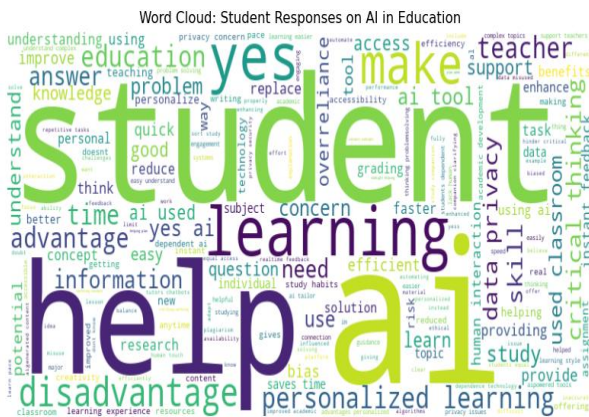


Figure 5. Word Cloud: Student Responses on AI in Education

In this study, to analysis of students' usage of artificial Intelligence tools in students learning. Four open-ended questions were asked to students, which were analyzed using Python's text analysis. The result of which was shown in figure:1. The findings suggest that AI tools are primarily used to learn, to take help solve problems, which supports efficient learnings. However, the analysis also highlights varying levels of dependency and critical engagement with these tools, indicating the need for guidance in using AI ethically and effectively. Overall, the incorporation of AI in student learning demonstrates significant potential to support academic development, provided it is implemented with clear objectives and personalized learning support.

5. CONCLUSION

To understand student engagement with AI tools, effective analysis of student usage of AI tools in learning, research should focus on understanding the specific AI tools usage. Qualitative analyses indicate that AI tools assist students in grasping complex subjects more effectively, enhancing their overall comprehension and learning experience. Findings from Principle component analysis reveals that that a single principal component sufficiently encapsulates the characteristics represented by the ten examined variables, suggesting a strong underlying factor influencing AI tool usage among students. In Principle Component Analysis it is found that only one component is effective enough in representing all the characteristics or components highlighted by the stated 10

variables. Result from proportion test, it was found that 90 % of the students use an AI tool to solve their academic problems. Text analysis demonstrate that AI tools are primarily used to learning purpose and problem-solving assistance, highlighting their role in facilitating efficient and effective learning strategies.

Author Statement

The authors declare no conflict of interest.

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