THE ROLE OF GENERATIVE AI APPLICATIONS ON STUDENT BEHAVIOR, CRITICAL THINKING SKILLS AND LEARNING MOTIVATION AMONG CBSE BASED HIGH SCHOOL STUDENTS IN COIMBATORE

ROSHINI VISWANATHAN

Research Scholar, KCT Business School, Kumaraguru College of Technology, Coimbatore

ABSTRACT

This study explores the impact of generative AI on student behavior, critical thinking, and motivation among CBSE high school students in Coimbatore. Data from 383 students were analyzed using correlation and regression techniques. Findings show AI enhances engagement, problem-solving, and enthusiasm for learning. Student behavior strongly correlates with critical thinking and motivation. AI tools foster independent thinking and active participation. However, balanced AI implementation is crucial for student development. Educators can use these insights to integrate AI effectively. Future research should explore AI's impact on diverse learning styles. Understanding AI's role can refine teaching strategies. Proper AI integration can revolutionize education.

Keywords: *Generative AI Applications, Student Behavior, Critical Thinking Skills, Learning Motivation, CBSE High School Education.*

ABOUT THE INDUSTRY

Over the last two decades, the education sector in India has undergone significant changes, driven by technological progress, innovative teaching methods, and the growing use of digital tools in classrooms. The Central Board of Secondary Education (CBSE), one of India's most prominent educational boards, focuses on a comprehensive curriculum designed to promote academic excellence, skill development, and holistic growth. Schools affiliated with CBSE, particularly in cities like Coimbatore, have increasingly embraced modern teaching approaches to improve student outcomes and meet the evolving demands of 21st-century education.

Recently, advanced digital tools such as chat bots, adaptive learning platforms, and virtual teaching assistants have gained popularity in education. These tools help students by offering tailored learning experiences, encouraging creativity, and enhancing problem-solving abilities. They align with the goals of the CBSE curriculum by supporting active learning, providing instant feedback, and fostering collaboration among students. Coimbatore, recognized as a thriving center for education, has witnessed a growing number of schools integrating these innovative digital tools alongside traditional teaching practices. These technologies hold great promise in meeting diverse student needs, boosting teacher effectiveness, and addressing resource constraints. However, while these tools offer significant benefits, their adoption in CBSE schools also presents certain challenges that need to be addressed.

REVIEW OF LITERATURE

According to the research **(Zhu & Ren, 2022),** it is critical to investigate how to use AI to successfully help teaching and learning as it continues to grow. This paper examines how artificial intelligence (AI) affects role cognition in Taiyuan City, Shanxi Province, Central China's educational system using a questionnaire survey approach. The study results show that the learning of AI-assisted courses is strongly dependent on course role cognition, and the construction of role cognition is related to the understanding of course content, teaching methods, and activity methods. Therefore, the effect of AI on role cognition in the education system needs to be systematically analyzed from the aspects of function realization form, resource presentation method, supporting hardware form, teacher-student interaction method, and representation method of works. AI-generated content tools and students' critical thinking: Insights from a Chinese university **(Zou et al., 2023),** This study examines the impact of artificial-intelligence-generated content tools on students' critical thinking skills and their attitudes

towards these tools. A survey of 851 students from a Chinese university was conducted to investigate their usage patterns, motivations, perceived benefits and risk awareness, and the importance of critical thinking skills. The study also explores how libraries and librarians can help students develop critical thinking skills. The findings reveal that male and non-binary students utilized artificial intelligence tools more frequently, highlighting a research gap. The study uncovers motivations such as saving time and effort. It also demonstrates students' awareness of the risks and limitations, emphasizing the need for critical thinking skills in navigating artificial-intelligence-generated content tools.

Jia and Tu (2024), carried out particular research about this said topic, and it states that despite the Artificial intelligence capabilities being applied in numerous educational institutions, the results show that significant correlation between AI capabilities and critical thinking skills among students cannot be observed. This study validates that although the influence of AI has prospects in various ways, students' usage of AI does not improve their rational thinking especially during Pandemic, a time where online classes were the only means for education to thrive. Although this study has no relationship, it is recommended that future researchers must still implement in depth additional research regarding students' improvement in critical thinking skills. The study, Assessment of the High School Students Critical Thinking skills, **(Okan Sarigoz ,2012)** is conducted to determine the high school student's critical thinking skills. This study is descriptive and done with the survey model. In order to measure the critical thinking skills of the students a 5-point Likert-type questionnaire composed of 21 questions is developed by the researcher. The sample of the study is 722 high school students from four different school types in the education year 2010-2011 from Hakkari. The Cronbach Alpha coefficient of the questionnaire is determined to be 0.87. Based on the F-test, t-test and the mean value the significance level is 0.05 and the results are evaluated with respect to this value. The results of the survey reveal that the critical thinking skills of the students vary between the school types namely, Anatolian High School, Science High School and Vocational High School.

The study, Exploring the Influence of Student Interaction with ChatGPT on Critical Thinking, Problem Solving, and Creativity **(Qawqzeh, Yousef, 2024)** revealed intriguing correlations among enhancements in critical thinking, problem-solving, creativity, and learning, hinting at an interconnectedness potentially influenced by ChatGPT. These findings strongly suggest ChatGPT's potential as an augmentative tool for enhancing learning capabilities across educational settings. In this comprehensive study, 515 participants within educational settings were engaged to investigate the multifaceted impact of ChatGPT interactions. By scrutinizing critical thinking, problem-solving, creativity, and learning domains, the research uncovered nuanced perspectives. The results presented diverse views on how ChatGPT influenced cognitive abilities—some observed substantial improvements, while others perceived limited effects.

OBJECTIVES

PRIMARY OBJECTIVE
- To examine the relationship and impact of generative AI applications on student behavior, critical thinking skills and learning motivation of the respondents.

SECONDARY OBJECTIVES
- To find out the level of usage of generative AI applications among high school students.
- To analyse the demographic profile of high school students.
- To understand the relationship between student behavior and critical thinking awareness.
- To analyze how student behavior influences learning motivation.
- To study the effect of learning motivation on critical thinking awareness among students.

METHODOLOGY
The Primary method of data collection for this study involves using structured questionnaires. Primary data is important because it is accurate, relevant, and directly aligned with the research goals. The questionnaire will

include 5-point Likert – scale questions designed to measure student behaviour, critical thinking skills, and learning motivation in relation to the use of generative AI applications

Research Design	Descriptive research
Sampling Technique	Simple random sampling
Sample Size	50 (from 10 SME)
Sources of Data	Primary Data
Tools	Percentage analysis, Descriptive analysis, Correlation and Regression Analyses.

DEMOGRAPHIC DETAILS

The demographic details are the most important and crucial basis of differentiating employee groups.

Table No.:1 Demographic Details wise Classification

S.No.	Demographic Details	Classification	Frequency	Percentage (%)
1	Gender	Male	187	49.0
		Female	196	51.0
		Total	383	100.0
2	Age	14	16	4.0
		15	118	31.0
		16	158	41.0
		17	91	24.0
		Total	383	100.0
3	Grade	IX	208	54.0
		X	175	46.0
		Total	383	100.0

The above table reveals the result of frequency distribution, which implies that the sample consists of 49.0% of male and 51.0% of female students. Minimum 4.0% of the students fall under the category of 14 years, maximum 41.0% of the students belongs to the age of 16 years, 31.0% and 24.0% of students belong to 15 and 17 years respectively. Maximum 54.0% of students are from IX grade and 46.0% of students from grade X respectively.

MEAN SCORE OF THE COMPETENCIES
Table No.:2 Mean Score of the Competencies

Competencies	Mean	SD
Generative AI usage	3.25	1.278
Student Behavior	3.23	1.329
Critical Thinking	3.24	1.288
Learning Motivation	3.29	1.290
Overall	3.252	1.296''

From the overall mean score, we can understand that the respondents are enough competent to do their job.

CORRELATION

Table No.:3 Karl- Pearson Correlation for factors of Generative AI Usage, Student Behaviour, Critical Thinking and Learning Motivation

	Gen AI	SB	CT	LM
Gen AI	1			
SB	.682**	1		
CT	.648**	.631**	1	
LM	.752**	.750**	.719**	1
. Correlation is significant at the 0.01 level (2-tailed).				

The above table shows the Pearson correlation values and their significance levels for Generative AI (Gen AI), Student Behavior (SB), Critical Thinking (CT), and Learning Motivation (LM). With a Pearson correlation value of .682, there is a positive and significant correlation between Generative AI and Student Behavior. Critical Thinking has a positive correlation with Generative AI and Student Behavior, with Pearson correlation values of .648 and .631, respectively. Generative AI, Student Behavior, and Critical Thinking have positive correlations with Learning Motivation, with corresponding Pearson correlation values of .752, .750, and .719

MULTIPLE REGRESSION ANALYSIS

Table No.:4 Multiple Regression results between Generative AI Usage, Student Behaviour, Critical Thinking and Learning Motivation

Relationship	R	R Square	Adjusted R Square	Standardized Beta (β)	t	Sig.
Gen AI ⇒ SB	.682a	.465	.464	.682	8.199	.000
Gen AI ⇒ CT	.648a	.419	.418	.648	6.585	.000
Gen AI ⇒ LM	.752a	.566	.565	.752	12.287	.000
SB ⇒ CT	.631a	.398	.396	.631	15.867	.000
SB ⇒ LM	.750a	.563	.562	.750	12.161	.000
LM ⇒ CT	.719a	.517	.516	.719	10.205	.000

According to table, Generative AI has a strong impact on student behavior, with a correlation of 0.682, accounting for 46.5% of its variance. It significantly influences critical thinking, showing a correlation of 0.648 and explaining 41.9% of the variations observed. Additionally, Generative AI enhances learning motivation, with a correlation of 0.752, contributing to 56.6% of its changes. Student behavior plays a crucial role in shaping critical thinking, demonstrating a correlation of 0.631 and explaining 39.8% of its variance. Likewise, student behavior strongly affects learning motivation, with a correlation of 0.750, accounting for 56.3% of its variation. Furthermore, learning motivation significantly influences critical thinking, with a correlation of 0.719, explaining 51.7% of the changes in critical thinking skills.

SUMMARY OF FINDINGS

LEVEL OF GENERATIVE AI APPLICATIONS USAGE, STUDENT BEHAVIOR, CRITICAL THINKING SKILLS AND LEARNING MOTIVATION AMONG HIGH SCHOOL STUDENTS:

- The majority of respondents strongly agree (mean value 3.25) the statement "Generative AI Applications have been integrated into my learning"

- The majority of respondents strongly agree (mean value 3.23) the statement "Generative AI Applications have improved my study routines and academic engagement"

- The majority of respondents strongly agree (mean value 3.24) the statement "I evaluate the value of new information or evidence presented to me by Generative AI"

- The majority of respondents strongly agree (mean value 3.29) the statement "Using generative AI makes me feel more independent in my learning journey"

IMPACT AND RELATIONSHIP AMONG GENERATIVE AI USAGE, STUDENT BEHAVIOUR, CRITICAL THINKING AND LEARNING MOTIVATION

- Generative AI shows a strong positive correlation with student behavior (**0.682**), critical thinking (**0.648**), and learning motivation (**0.752**), indicating its significant role in shaping these factors.

- Student behavior is positively correlated with critical thinking (**0.631**) and learning motivation (**0.750**), suggesting that improved student behavior enhances both motivation and critical thinking skills.

- Learning motivation has a strong association with critical thinking (**0.719**), implying that students who are more motivated tend to develop better critical thinking abilities.

- Generative AI positively influences student behavior (**r = 0.682, R^2 = 46.5%**), significantly impacts critical thinking (**r = 0.648, R^2 = 41.9%**), and strongly enhances learning motivation (**r = 0.752, R^2 = 56.6%**), indicating its crucial role in shaping student engagement, cognitive abilities, and behavioral development.

- Student behavior positively affects critical thinking (**r = 0.631, R^2 = 39.8%**) and influences learning motivation (**r = 0.750, R^2 = 56.3%**), highlighting the strong connection between behavioral engagement, analytical skills, and motivation.

- Learning motivation strongly impacts critical thinking (**r = 0.719, R^2 = 51.7%**), suggesting that higher motivation leads to enhanced critical thinking abilities.

SUGGESTIONS

- The widespread use of Generative AI in education raises ethical concerns, including misinformation, over-reliance on AI, and data privacy. Schools should also implement digital responsibility programs to educate students about AI ethics, critical evaluation of AI-generated content, and the importance of balancing AI assistance with human reasoning.

- Future research could adopt a longitudinal approach to assess the long-term impact of Generative AI on student learning outcomes. This will provide deeper insights into how AI-driven education influences student development over time.

CONCLUSION

In conclusion, this research on the role of Generative AI in shaping student behavior, critical thinking, and learning motivation provides valuable insights into its growing influence in the education sector. The study examined the extent to which students engage with Generative AI applications and how these tools impact their cognitive skills and motivation levels. The findings indicate that students strongly acknowledge the role of AI in enhancing their study routines, fostering independent learning, and improving their ability to evaluate information critically.

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