

Impact of Chat GPT on Academic Performance Among Undergraduate Students in the State of Goa

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Abstract

Artificial intelligence refers to the simulation of human intelligence processes by machines, particularly computer systems. These processes include the acquisition of information and rules for using the information, using rules to reach approximate or definite conclusions and self-correction. The study aims to understand how the integration of ChatGPT into educational settings affects students' learning outcomes, study habits, and overall academic performance. It focused on exploring the integration of ChatGPT in the Goa's education sector. Descriptive Analysis, Factor Analysis and Regression Analysis has been carried out on the Data collected. The findings showed a significant influence of ChatGPT on various aspects of academic progress, including Learning Dynamics, Academic Support, Skills Enhancement, Academic Growth and Academic Performance Enhancement. The study highlights the importance of integrating AI technologies responsibly to enhance teaching methods, improve learning experiences, and boost student academic performance. The study concluded that ChatGPT play a significant role in shaping the future of education in Goa, emphasizing the need for ethical and responsible use of AI technologies to optimize student academic performance and enhance learning outcomes among undergraduate students.

Keywords: Artificial Intelligence, Chat GPT, Education, Undergraduate, Goa

INTRODUCTION

Artificial Intelligence and Machine Learning are the two main elements in the modern world. AI-powered chatbots, or more particularly Chat GPT, are among the most significant inventions made useful by artificial intelligence (Tanvir et al., 2023). The integration of Chat GPT in the educational sector has the potential to significantly impact students' academic performance by providing them with personalized and interactive learning experiences. Chat GPT, powered by advanced AI technology, offers students the opportunity to receive instant answers to their queries, explanations of complex concepts in a clear and concise manner, and tailored learning resources based on their individual learning styles and preferences. This personalized approach to education can enhance students' understanding of various subjects, improve their language skills, and support them in achieving academic success.

Moreover, Chat GPT can serve as a virtual tutor, guiding students through coursework, providing feedback on assignments, and offering personalized learning recommendations based on their progress and

performance. By leveraging AI capabilities, Chat GPT can adapt instruction to individual student needs, provide real-time feedback and assistance, and promote student engagement and comprehension. This not only enhances the learning experience for students but also allows educators to scale personalized learning experiences to a larger audience, making education more accessible and effective.

Chat GPT involves acknowledging the existence and potential applications of this AI model in various domains, such as content generation, education, and conversational interfaces. In recent years, there has been a surge in the adoption of AI-driven technologies in education, with AI chatbots like ChatGPT emerging as prominent tools for supporting student learning. As educational institutions strive to innovate and improve academic outcomes, understanding how these technologies influence students' academic performance becomes increasingly important. By examining the impact of ChatGPT on various aspects of academic performance, such as grades, comprehension, retention, and engagement, the study aims to provide its potential benefits and challenges. Additionally, it explores the students' perceptions, experiences, and attitudes towards ChatGPT by shedding light on their role in shaping academic outcomes. While Chat GPT holds immense potential to revolutionize education and improve academic outcomes, its implementation also raises ethical considerations. Issues such as data privacy, algorithmic bias, and the need for human oversight to ensure responsible use are crucial aspects that need to be addressed. As technology continues to evolve, Chat GPT is expected to play an increasingly integral role in shaping the future of education, offering students worldwide the opportunity to access personalized, engaging, and effective learning experiences that cater to their individual needs and preferences.

LITERATURE REVIEW

Afjal (2023) studies the impact of Chat GPT on AI research, including its applications, consequences, problems, and potential to influence future AI trends, was examined in this study. In order to look at research trends, the study used Biblioshiny and VOS viewer to conduct a bibliometric analysis. According to the analysis, there is enough interest in and involvement with Chat GPT in AI studies and applications, as indicated by phrases connected to AI. According to the study's findings, the extensive use of Chat GPT and AI-related terminology highlights the technology's important significance and expanding promise in the field of AI research.

Bonsu, Baffour-Koduah (2023) examines how students see ChatGPT and how they plan to use it for their postsecondary education. Even though artificial intelligence (AI) is being used extensively in many different industries, not much is known about how students view and intend to use ChatGPT throughout their time in higher education. There is no statistically significant correlation between the perceptions of students and their plans to utilise ChatGPT, according to the investigation. Based on the favourable comments from students, the study promotes the use of ChatGPT in the classroom. The results point to possible advantages and advantages for using ChatGPT into settings related to higher education. According to the study's findings, students had a favourable opinion of ChatGPT because of its accuracy, convenience, and ability to provide improved outcomes.

Saxena et al. (2023) discusses the potential of ChatGPT in academic learning and student assessments, as well as the ethical implications of its integration into these areas. It highlights ChatGPT's ability to generate coherent and contextually-relevant text, revolutionizing academic learning. The study also emphasizes the

model's applications in virtual learning environments, online courses, and its potential to cut down on time needed for class preparation. The study concludes that ChatGPT has significant potential applications in academia but raises ethical concerns related to privacy, security, and job displacement. It emphasizes the need for responsible use of AI technologies in education and suggests the development of guidelines for ethical and responsible use of ChatGPT in academic settings.

Tanvir et al. (2023) explores the influence of ChatGPT, an AI-powered chatbot, on the academic performance of undergraduate students in Bangladesh. The study focuses on the factors of plagiarism, creativity, motivation, and their interconnections. The research is based on data collected from 100 undergraduate students who had access to ChatGPT. The research findings indicate significant associations between plagiarism, creativity, motivation, and academic achievement. The ease of using ChatGPT for generating content may lead students to rely heavily on the tool, hindering the development of their creative skills and uniqueness. Therefore, the study emphasizes the importance of promoting ethical AI tool usage and nurturing individual creative thinking among students.

Tiwari et al. (2023) using the Technology Acceptance Model, the authors of this research investigate the variables affecting students' opinions regarding the usage of Chat Generative Pre-Trained Transformer (ChatGPT) in educational settings. Based on 375 student survey responses, the study uses structural equation modelling using partial least squares to shed light on ChatGPT acceptance and use. According to the survey, students have a favourable opinion of ChatGPT when it comes to educational uses. According to the study, ChatGPT gives students more self-assurance and enthusiasm, which could boost their reading and general awareness. The study's insightful analysis of ChatGPT's adoption characteristics, which greatly advances the body of knowledge on cutting-edge educational technologies, is presented in its conclusion.

IDENTIFICATION OF THE RESEARCH PROBLEM

For the purpose of the study, an extensive Literature survey was conducted. The literature survey of 5 research papers conducted. Existing literature has examined the impact of ChatGPT on academic performance in different geographical locations, but there is a lack of research specific to the State of Goa. The studies have shown that ChatGPT can influence student motivation, creativity, and learning outcomes, but it is essential to investigate how these effects manifest among undergraduate students in Goan educational institutions.

While some research has explored student perceptions and attitudes towards ChatGPT, there is a need to find deeper into the actual academic performance outcomes resulting from the use of this AI technology in Goan institutions. Therefore, the proposed study attempts to fill the gap and open doors for researchers to explore and contribute further to this area of research.

RESEARCH QUESTIONS

1. How does the utilization of ChatGPT influence student academic performance among the selected students in the state of Goa?

OBJECTIVE OF THE STUDY

1. To test the influence of Chat GPT facility on student's academic performance among the selected students.

RESEARCH METHODOLOGY

As per the above-mentioned areas of the proposed research, a suitable research methodology has been designed and discussed below.

- a. **Universe:** The total number of Students doing Graduation in the state of Goa is considered as the universe.
- b. **Sample size:** The total of 200 students have been selected for the purpose of study.
- c. **Sampling technique:** The data is collected by using purposive sampling method.
- d. **Period of the study:** For the present area of research period of the survey is considered to be the period of the study. The period of survey is from December 2023 to January 2024 i.e., 1 month.
- e. **Sources of Data Collection**
 - **Primary source:** The required data that comprises of the major portion of the present research has been collected by way of administering well-designed and structured questionnaire.
 - **Secondary source:** The relevant secondary information has been gathered from various journals and electronic media.
- f. **Hypothesis**

H₀1: There is no significant influence Learning Dynamics, Academic Support and Skills Enhancement, Academic Growth, Optimized Academic Learning, Academic Performance Enhancement on AI powered Academic Competency.
- g. **Data Analysis Tools:** For the purpose of presentation and analysis of data following statistical tools will be applied:
 1. Descriptive Analytics
 2. Factor Analysis
 3. Regression Analysis

SIGNIFICANCE OF THE STUDY

1. This study holds significant importance as it aims to address a research gap in the existing literature by focusing specifically on the impact of ChatGPT on academic performance among undergraduate students in the State of Goa. The study can enhance our understanding of how AI technologies influence learning outcomes in this region.
2. As the educational landscape continues to evolve with advancements in technology, this study plays a crucial role in shaping the future of education in the State of Goa. By examining the influence of ChatGPT on academic performance, the research could lead to new and creative ways of teaching that use AI to make learning better for students.

LIMITATIONS OF THE STUDY

1. The response from the respondents may be biased.

DATA ANALYSIS AND INTERPRETATION

Table No. 1 Respondents Profile

Sr No.	Demographic Factor	Frequency	Percentage
1.	Gender		
	Male	95	47.5
	Female	105	52.5
	Total	200	100
2.	Educational Qualification		
	Bachelors	141	70.5
	Masters	59	29.5
	Total	200	100
3.	Field of Study		
	Commerce	141	70.5
	Arts	21	10.5
	Science	38	19.0
	Total	200	100
4.	Year of Study		
	First Year	40	20.0
	Second Year	60	30.0
	Third Year	100	50.0
	Total	200	100

Source: Computed from Primary Data

Table No. 1 indicates that, of the total respondents, 47.5% are males and 52.5% are females. Hence, it can be observed that out of the total respondents, Female respondents forms a majority than Males. This means that the features of Chat GPT that meet the needs and preferences of both male and female users, improves the overall usability. Out of the total respondents, 70.5% had a bachelor's degree and 29.5% had a master's degree. This indicates that the majority of the respondents were pursuing higher education. By taking into account the educational qualifications of users, such as whether they are bachelor's or master's students,

helps to tailor usability features to better suit their academic objectives, knowledge, and preferred learning methods. The Table No 1 also shows that out of the total 200 respondents, 70.5% were studying Commerce, 10.5% were studying Arts, and 19% were studying Science. This indicates that the majority of the respondents were pursuing education in commerce fields falling under the age group of 18-24. By understanding the field of study helps in the customization of Chat GPT functionalities to better support subject-specific learning needs, terminology, and content generation, which enhances the usability within different academic disciplines.

It can be also seen that out of the total respondents, 20% were in their first year, 30% were in their second year, and 50% were in their third year. This indicates that the majority of the respondents were in their third year of study and are using Chat GPT.

Overall, the demographic profile of the respondents provides the characteristics of the students surveyed for the study on usability of Chat GPT by the student users. The majority of the respondents were female, pursuing higher education in commerce field, in their third year of study using Chat GPT.

ANALYSIS OF FACTORS HIGHLIGHTING THE CONTRIBUTION OF CHAT GPT IN ACADEMIC PERFORMANCE OF THE STUDENTS

An Analysis has been done to identify the factors contributing the student's academic performance by using Chat GPT. For the purpose of analysis, 18 variables have been used through a Factor Analysis. KMO and Bartlett's Test is one of the prime tests required for factor analysis. This test shows that the sample is adequate for further analysis.

The value of the sample adequacy test is 0.902 which is quite good to be acceptable for the factor analysis to be done. This is further proved by the significance level at 5 percent which shows a value of 0.000.

For the purpose of factor analysis, a rotated component matrix has been constructed where the varimax method of rotation with Kaiser Normalization has been chosen and principal component analysis has been considered as an extraction method. The output of factor analysis provides the 5 most prominent factors from 20 items. The following table shows the output of factor analysis done on 20 items.

Table No. 2 Factors highlighting the Contribution of Chat GPT in Academic Performance of Students

S. No.	Factors	Items	Factors	Eigen value	Percent of Variance	Cronbach alpha
1.	Learning Dynamics	Collaborative Learning Support	0.709	3.387	13.550	0.727
		Enhanced deeper Understanding	0.669			
		Motivated Learning Boost	0.646			
		In-Class Learning	0.603			

		Experiences				
		Exam Preparation	0.545			
2.	Academic Support and Skills Enhancement	Assured Academic Support	0.796	3.101	12.402	0.743
		Critical Thinking Skills in Academics	0.732			
		Improved Academic Time Management	0.599			
		Study Time Management	0.577			
		Boosts Confidence	0.535			
3.	Academic Growth	Development of Skills	0.806	2.800	11.200	0.759
		Language and Communication Skills	0.724			
		Variety of Academic Subjects	0.625			
		Enhanced Self-Reliance	0.502			
4.	Optimized Academic Learning	Enhanced Course Comprehension	0.800	2.777	11.109	0.813
		Improved Academic Understanding	0.775			
		Enhanced Learning Efficiency	0.751			
		Quick Conceptual Understanding	0.558			
5.	Academic Performance Enhancement	Improvement in Academic Grades	0.745	2.146	8.585	0.735
		Increase in Exam Study Productivity	0.672			

Source: Computed from Primary data

A total of 20 variables have been used in the analysis where the Factor Analysis has derived 5 factors. The principal component method with varimax rotation has derived these factors with eigen values of more than one and a total variance of 56.845.

The 1st factor comprises 5 variables and it is named as 'Learning Dynamics'. The factors included are Enhanced deeper Understanding, Motivated Learning Boost, Collaborative Learning Support, In-Class

Learning Experiences and Exam Preparation and it highlights a comprehensive approach to learning that focuses on deep understanding, motivation, collaboration, in-class experiences and exam preparedness, all facilitated by ChatGPT. The factor is reliable with a constructed Cronbach alpha to explain its reliability to the extent of 0.727

The 2nd factor comprises 5 variables and it is named as 'Academic Support and Skills Enhancement'. The factors included Assured Academic Support, Critical Thinking Skills in Academics, Study Time Management, Improved Academic Time Management and boost confidence and it highlights the various ways in which ChatGPT provides academic support and enhances skills, including ensuring academic assistance, improving critical thinking skills, managing study time effectively, boosting confidence and optimizing overall academic time management. The factor is reliable with a constructed Cronbach alpha to explain its reliability to the extent of 0.743.

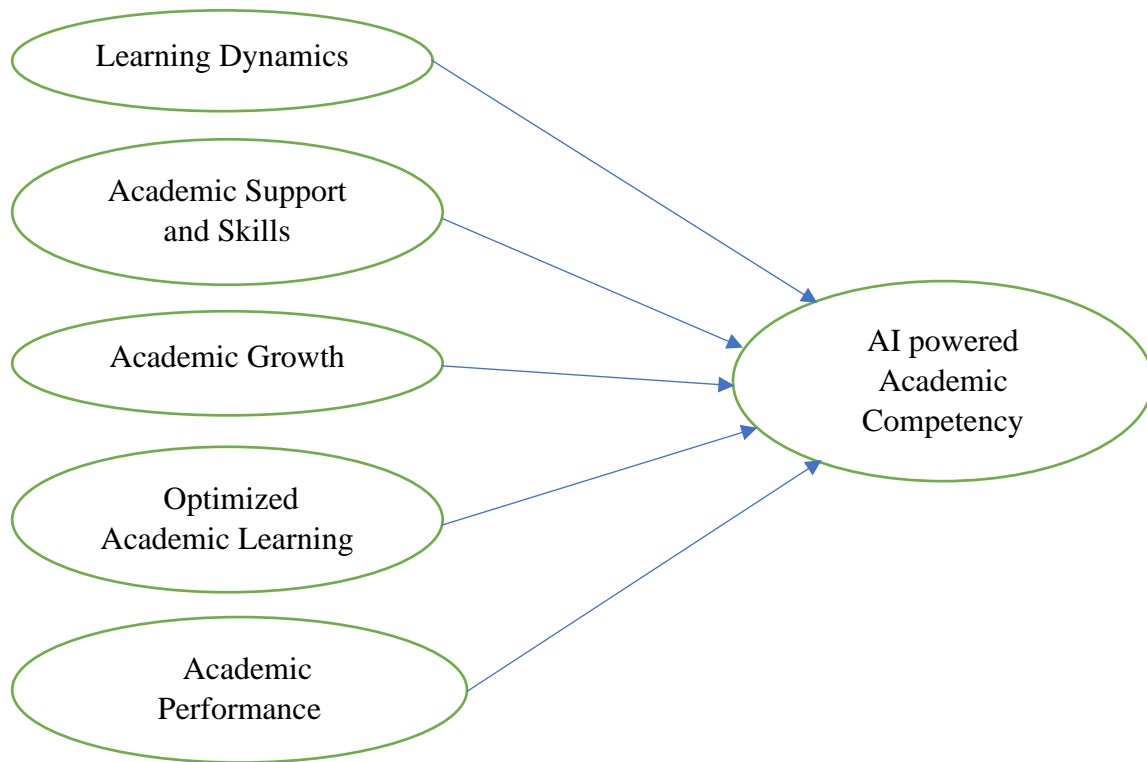
The 3rd factor comprises 4 variables and it is named as 'Academic Growth'. The factors included Development of Skills, Language and Communication Skills, Variety of Academic Subjects and Enhanced Self-Reliance and it highlights the overall growth and development in academics facilitated by ChatGPT, including the development of skills, enhancement of language and communication skills, exposure to a variety of academic subjects, and fostering self-reliance in studies. The factor is reliable with a constructed Cronbach alpha to explain its reliability to the extent of 0.759.

The 4th factor comprises 4 variables and it is named as 'Optimized Academic Learning'. The factors included are Enhanced Course Comprehension, Improved Academic Understanding, Quick Conceptual Understanding and Enhanced Learning Efficiency and it highlights the focus on enhancing academic learning through improved comprehension of course material, better and quick understanding of academic concepts, and increased efficiency in the learning process, all achieved through the use of ChatGPT. The factor is reliable with a constructed Cronbach alpha to explain its reliability to the extent of 0.813.

The 5th factor comprises 2 variables and it is named as 'Academic Performance Enhancement'. The factors included are Improvement in Academic Grades and Increase in Exam Study Productivity and it highlights the overall enhancement of academic performance achieved through improvements in grades and increased productivity in exam preparation, all facilitated by ChatGPT. The factor is reliable with a constructed Cronbach alpha to explain its reliability to the extent of 0.735.

The five factors obtained above have been regressed with the dependent variable, Satisfaction with Academic Progress. These factors explain the influence on dependent variable and are explained below in the Figure No.1

Figure No.1 Regression Model Showing factors highlighting Contribution of Chat GPT in Academic Performance of Students



Source: Designed for testing

The following hypothesis has been framed and tested using Regression Analysis.

H0₁: There is no significant influence Learning Dynamics, Academic Support and Skills Enhancement, Academic Growth, Optimized Academic Learning, Academic Performance Enhancement on AI powered Academic Competency.

Table No. 3 Regression Analysis Showing factors highlighting Contribution of Chat GPT in Academic Performance of Students

H0₁: There is no significant influence Learning Dynamics, Academic Support and Skills Enhancement, Academic Growth, Optimized Academic Learning, Academic Performance Enhancement on AI powered Academic Competency.			
Dependent Variable: AI powered Academic Competency			
P Value: 0.000		F Value: 29.723	
		R²: 0.434	
Independent Variable	Beta	T. Test	Sig. Value
Constant	3.920	93.393	0.000
Learning Dynamics	0.207	4.913	0.000

Academic Support and Skills Enhancement	0.164	3.892	0.000
Academic Growth	0.406	9.642	0.000
Optimized Academic Learning	0.077	1.831	0.069
Academic Performance Enhancement	0.152	3.605	0.000

Source: Computed from Primary Data

The above Table No. 3 shows the results of Regression Analysis. It can be observed that the overall model is significant since P value is 0.000 which is less than 0.05. Therefore, reject the null hypothesis i.e.,

H0₁: There is no significant influence Learning Dynamics, Academic Support and Skills Enhancement, Academic Growth, Optimized Academic Learning, Academic Performance Enhancement on AI powered Academic Competency.

Accept H₁: There is significant influence Learning Dynamics, Academic Support and Skills Enhancement, Academic Growth, Optimized Academic Learning, Academic Performance Enhancement on AI powered Academic Competency.

With the above results, it is observed that the strength of the model is explained to the extent of 43%. This may be observed from the R² which is obtained as 0.434. The R² of 43% indicates that there are 57% other factors that may also influence the AI powered Academic Competency.

The above interpretation can be shown in the following regression equation.

$$Y = \alpha (\text{alpha}) + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4$$

AI powered Academic Competency = 3.920 + 0.207 (Learning Dynamics) + 0.164 (Academic Support and Skills Enhancement) + 0.406 (Academic Growth) + 0.152 (Academic Performance Enhancement)

This means that if 1 unit of the Learning Dynamics increases, it will lead to a corresponding increase of 0.207 on AI powered Academic Competency. It can also be seen that if Academic Support and Skills Enhancement increases by 1 unit, the corresponding AI powered Academic Competency will be increased by 164 points. Further, Academic Growth have also found a positive relationship with the AI powered Academic Competency. Hence, we can say that that if 1 unit of the Academic Growth increases, there will be a corresponding increase of 0.406 on AI powered Academic Competency whereas, it can also be seen that if Academic Performance Enhancement increases by 1 unit, the corresponding AI powered Academic Competency will be increased by 152 points.

As far as hypothetical results are concerned, out of five independent variables i.e., Learning Dynamics, Academic Support and Skills Enhancement, Academic Growth, Optimized Academic Learning and Academic Performance Enhancement, four variables are found to be significant i.e, Learning Dynamics, Academic Support and Skills Enhancement, Academic Growth and Academic Performance Enhancement are found to be significant. Therefore, it may be concluded that Learning Dynamics, Academic Support and

Skills Enhancement, Academic Growth and Academic Performance Enhancement has a significant influence on AI powered Academic Competency.

CONCLUSION

Chat GPT is a revolutionary technology that has significantly influenced the way humans connect with each other and with machines. Despite being a small contribution to this study on the Impact of ChatGPT on Academic Performance among Undergraduate Students in the State of Goa highlights the significant influence of AI technologies on academic progress. This was found out using Factor Analysis and Regression Analysis where five prominent factors were derived and out of five independent variables, four were found to be significant i.e., ChatGPT was found to positively impact various aspects of academic performance, including Learning Dynamics, Academic Support, Skills Enhancement, Academic Growth and Academic Performance Enhancement. By focusing on the state of Goa, the research contributes to the understanding of how AI tools can enhance teaching methods and improve learning outcomes for students. The study emphasizes the importance of promoting ethical AI tool usage and nurturing creative thinking among students to prevent over-reliance on technology. The findings suggest that the potential of AI technologies like ChatGPT to revolutionize education in Goa and emphasize the need for responsible integration to optimize student academic performance.

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