

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

Navneet Bora^{1*}, Shifa Thokan²

ABSTRACT

The study investigated the correlation between use of Conversational Artificial Intelligence (CAI) and Academic Anxiety, as well as Academic Motivations among Indian students. A review of the literature indicates that technology plays a crucial role in alleviating academic anxiety. The primary objective of this study was to ascertain if there is an existence of a relationship between the use of CAI and Academic Anxiety in Indian students. To achieve this, data were gathered from students in Indian educational institutions, utilizing two standardized psychometric tools measuring both the use of Chatbots and levels of Academic Anxiety. Pearson Product Moment correlation was computed, the findings from this study revealed a non-significant correlation between these two variables, $r(119) = .06, p > .05$. Subsequently, a second study was conducted to assess the authors' adapted theory, integrating Igarria's Technology Acceptance Model with Intrinsic and Extrinsic Motivation, specifically in the context of Chatbot usage. Data were again collected from Indian students across various educational levels, employing two standardized psychometric tools measuring the use of Chatbots and Academic Motivation. After the results from Multiple Linear Regression were found non-significant, $F(2,134) = 0.87, p > 0.05$, a linear regression between Extrinsic Motivation and Use of Chatbots indicated that Extrinsic Motivation was a weak but a statistically significant predictor of Chatbot usage among Indian students, $F(1,135) = 4.855, p < .05$. Consequently, the authors conclude that Extrinsic Motivation constitutes a noteworthy factor influencing students' engagement with Chatbots, being used by students to enhance academic performance and, concurrently, leading to the reduction of academic anxiety.

Keywords: Chatbots, Conversational Artificial Intelligence, Academic Anxiety, Extrinsic Motivation, Intrinsic Motivation

Study 1: Relationship of Conversational Artificial Intelligence with Academic Anxiety

Introduction

The advent of AI based chatbots have had a considerable influence on Indian Students. Authors have seen a significant rise in the use of tools based on AI by students. Thus, they tried to find correlates associated with the use of chatbots by students. One of the problems that are faced by students is dealing with academic anxiety, and with no concrete study on the use of CAI or chatbots for alleviation of academic anxiety currently, the authors have

¹University Department of Applied Psychology, Mumbai University, Mumbai, Maharashtra, India.

²University Department of Applied Psychology, Mumbai University, Mumbai, Maharashtra, India.

*Corresponding Author

Received: December 01, 2023; Revision Received: December 05, 2023; Accepted: December 09, 2023

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

therefore tried to explore if a relationship exists between academic anxiety and use of chatbots.

Conversational Artificial Intelligence, CAI or Chatbots is an umbrella term used to denote the use of software that mimic Human Conversational Intelligence. Some of Chatbots popular among students are Chatgpt, Google Bard, Siri, etc. Academic Anxiety entails anxiety in students stemming from institutional elements. Such as class performance, performance anxiety, submission of assignments, fear of teachers etc. Anxiety is a common disorder that affects people of all ages. It could result from a combination of physical, mental, and drug-related conditions or outcomes. Anxiety related to impending risk from the settings of Academic institutions is known as Academic anxiety (Attri & Neelam, 2013; Hooda & Saini, 2017). Digital agents that converse with users and interact with them socially are known as CAI (Khatra et al., 2018 as cited in Hu et al., 2023).

AI is a subfield of computer science; built in such a manner that it can simulate human intelligence and solve daily life problems. Currently, Conversational AI research centers on advancing algorithms like AI, machine learning, and neural networks (APA, n.d.; Song & Xiong, 2021). Chatbots, or conversational agents, are digital tools using these technologies to mimic human behavior and provide evolving dialogue within a task-oriented framework. Examples of such tools include Google Assistant, Siri, Amazon and Chatbots such as BingAI, ChatGPT and Google Bard (Vaidyam et al., 2019; Rudolph et al., 2023). One of the most recent and popular Chatbots among students is ChatGPT. ChatGPT is a flexible tool that can help in open education by giving individualized support, direction, and feedback to self-directed learners, thereby boosting motivation and engagement. It can generate writing that closely resembles human language and has the ability for multiple ongoing conversations (Biswas, 2023).

Chatbots have been categorized by Adamopoulou and Moussiades (2020) based on a number of criteria, including build method, goals, input processing, response generation, human aid, and knowledge domain. Under knowledge domain, open domain chatbots cover a broad range, whereas closed domain chatbots specialize in specific subjects. Service classification considers sentimental proximity, intimate connection volume, and tasks. Booking reservations, booking flights, and answering frequently asked questions are among the services provided by interpersonal chatbots in communication spaces. Intrapersonal chatbots, which may be found on WhatsApp, Slack, and Messenger, operate in a user's private environment. Inter-agent chatbots are another popular kind; the combination of Alexa and Cortana are examples. Goal based chatbots include Conversational chatbots that have interactive dialogues with users by responding to statements in a manner similar to that of a real person, Task-based chatbots that carry out particular tasks, including booking reservations. (Nimavat & Champaneria, 2017; Kucherbaev et al., 2018 as cited in Adamopoulou & Moussiades, 2020).

Conversational chatbots can have several benefits for students. It is possible for Chatbots to instantly present students with standardized information such as evaluation requirements, deadlines, and the location of suggested resources, chatbots have the potential to boost student involvement and support while also dramatically reducing the administrative work that lecturers must do, freeing them up to focus on research and course development (Singh, 2018 as cited in Cunningham-Nelson et al., 2019). Researchers have also discovered that interacting with Chatbots generally boosts students' interest in learning, which has prompted

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

the creation and use of educational Chatbots (Johnson, 2001 as cited in Hwang & Chang, 2021). Qualitative case study approach by Tili et al. (2023) showed that ChatGPT is a useful educational tool. Hamada et al. (2023) stated that the capacity of ChatGPT to swiftly adjust to new information enables it to handle new subjects and tasks without needing considerable retraining. ChatGPT is a good option for large-scale applications because of its scalability. Systems like Chatgpt assist students achieve better learning outcomes by understanding their learning preferences and tailoring the content and instructional strategies to suit them (Zhai, 2022 as cited in Hariri, 2023). ChatGPT has quickly become recognised as a useful tool for both professionals and students. By creating new opportunities for individualized instruction, feedback, and support, AI may enhance learning outcomes, productivity, and student engagement (Adiguzel et al., 2023).

Rehman (2016) mentioned a few dimensions associated with Academic Anxiety. Symptoms of Academic Anxiety may include any new Academic task that a student begins with abnormal behavior, such as procrastinating, excessive worrying, failing classes, and withdrawing from peer interaction or engaging in interests-related activities. Sources may include, anxiety from school environment, anxiety from teachers, anxiety from examination, anxiety from and subjects that students are not good at or disinterested in. According to Wang (2023) there are many different elements that might contribute to Academic anxiety, including family issues, school-related issues, and issues related to self. Shahrouri (2016) found that there are five domains related to sources of Academic anxiety for university students. Domains being: Study Anxiety, Foreign Language Anxiety, Social Anxiety, Emotional Anxiety, and Parental Expectations. Academic anxiety in students can be brought on by a variety of factors, such as the possibility of physical violence, concerns about one's appearance, difficulty with certain school subjects, and the teacher's numerous demands that require understanding in multiple topics in short time span (Azhari et al., 2022).

Controlling academic anxiety can enhance Academic performance because it is one of the significant elements that hinders students' Academic progress. It was found that when students' academic performance deteriorates their academic anxiety increases (Huberty, 2012 as cited in Hooda & Saini, 2017). Mahato and Jangir (2012) found that extremely high levels of academic anxiety can have long-lasting mental and physical effects on students. Academic Anxiety frequently causes issues with concentration during studying and memory during test-taking, resulting in the student feeling hopeless and like a failure. Anxiety can affect a person's ability to concentrate while studying and have problems remembering and recalling information when it exceeds a certain threshold. Academic anxiety is a type of anxiety that is associated with the approaching risk from the environment of Academic institutions, especially teachers in particular courses like mathematics, English, etc. As a result of a school setting that is seen adversely, it is a mental experience of unease or worry (Arora, 2022; Shakir, 2014 as cited in Arora, 2022).

Fulmer et al. (2018) found that AI based conversational Chatbots, reduced the level of anxiety in students. Findings by Klos et al. (2020) showed that use of Chatbots significantly reduces the university student's anxiety. Han (2020) found that voice-based AI Chatbots can reduce anxiety and increase performance of Korean middle-school English learning students. According to Romanovskyi et al. (2021) use of Elomia chatbot resulted in significant reduction in Depression and anxiety. Expert Decision Making Chatbots help reduce students' learning anxiety (Hsu et al., 2023). Toribo (2023)'s study showed that self-regulated learning using AI tools attenuates Academic anxiety. Study by Bhuttah et al.

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

(2021) supported the idea that technical support for scientific courses might lower anxiety and increase students' interest in the topic. Kim et al. (2021) also showed that major benefit of using AI chatbot was that it reduced the anxiety level of the students that helped them learn to converse more confidently. AI based educational intervention helped lower anxiety among middle school children (Crompton et al., 2019 as cited in Adiguzel et al., 2023).

There are worries that chatbots may affect students' ability to think critically, solve problems, and encourage academic dishonesty. Academic merits and cons of ChatGPT are examined by APA. ChatGPT can be a useful academic tool, freeing up cognitive resources for the development of higher-order skills, despite ethical problems in particular courses. Promoting student engagement through interactive discussions, breaking down tasks, and providing frequent feedback are crucial in addressing concerns about plagiarism (Abramson, 2023).

Some dimensions of Academic Anxiety forementioned can be alleviated due to the advent of CAI or Chatbots. There is a possibility that students use this new technology to ease their Academic anxiety since Chatbots have plenty of benefits that are mentioned above vis-à-vis Academic life of students. The review of literature therefore shows that socially anxious adolescents have a greater technology dependence, use of AI helps students ease their anxiety, increase confidence and instill a greater propensity to use CAI for academics.

THEORETICAL FRAMEWORK

Igbaria's Model (IM)

According to the Igbaria's Model (IB) when it comes to the acceptance or rejection of a new technology the intrinsic and extrinsic motivators of an individual have an effect (Igbaria et al., 1994 as cited in Taherdoost, 2007).

This model was conceptualized by Igbaria et al. (1994) that was based upon the widely accepted model of TAM also known as Technology Acceptance Model by Davies et al. (1989), IB focuses on two modes of intrinsic and extrinsic motivators also known in the IB model as "Perceived Usefulness" and "Perceived Fun", the former also being known as "Extrinsic Motivator". Perceived usefulness affects users' acceptance of computer systems. It is founded on the Motivator theory, which contends that people are more willing to accept new technology if they believe it will help them achieve important goals. Perceived usefulness tends to demonstrate a consistent association with usage behavior and intentions (Davis et al. 1989 as cited in Igbaria et al., 1994).

Perceived Fun is also known as "Intrinsic Motivator". An illustration of intrinsic Motivator is perceived enjoyment, which is the act of engaging in an activity for no apparent reward other than the act of engaging in the action itself. People are more inclined to use computers more frequently than others if they personally derive immediate pleasure and satisfaction from using them and believe that using a computer is fun in and of itself, regardless of any potential performance repercussions (Davis et al., 1992; Malone 1981 and Webster, 1989 as cited in Igbaria et al., 1994). This model additionally talks about the antecedent of both the motivators, that is "Computer anxiety". Computer anxiety has been identified as a significant factor in the perception of usefulness, attitude, and usage in a number of research (Gilroy & Desai, 1986; Igbaria & Chakrabarti, 1990; Morrow et al., 1986 as cited in Igbaria et al., 1994) Computer anxiety has a potential to be included in future analyses of the factors influencing people's adoption of new technology (Davis et al., 1989 as cited Igbaria., 1994).

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

Peoples' acceptance or rejection of microcomputer technology depends more on perceived usefulness than on fun. Perceived usefulness and fun had comparable effects on frequency and duration of usage, however the results showed that perceived usefulness is nearly six times more influential than fun in identifying the reasons for utilizing the system (Igarria & Chakrabarti, 1990 as cited in Igarria, 1994).

The authors adapt Igarria's Model (IB). In this model, authors use the explicit idea of "Computer Anxiety" and substitute it with "Academic Anxiety". It can have two implications. One with intrinsic motivator and the other with extrinsic motivator. The intrinsic motivator is the natural inclination of every human (student) to reduce his trait Academic anxiety, intrinsic motivator is what causes a feeling of immediate pleasure and satisfaction after the trait Academic anxiety has been reduced.

Extrinsic motivator is associated with perceived usefulness of the technology, when a student is under Academic anxiety. There will be an extrinsic need for the student to reduce Academic anxiety apart from the natural inclination, so the use of CAI will depend upon the usefulness of the Chatbots or CAI software that are available to the student.

Moreover, adoption is influenced by both directly (through satisfaction) and indirectly (by perceived fun and usefulness). In addition, perceived utility affects enjoyment perception. A clear link between computer satisfaction and usage has also been demonstrated (Taherdoost, 2007).

So, the authors purport that the level of Academic anxiety in the student will affect the extent to which a student uses CAI software or Chatbots. A student who has less Academic anxiety will be more open to using CAI for intrinsic motivator aka "Perceived Fun" that does not center around the level of usefulness of the technology whereas a student with high Academic anxiety will use it because of "Perceived Usefulness". Academic Anxiety will predict the use of CAI.

Figure 1.1 Igarria's Model

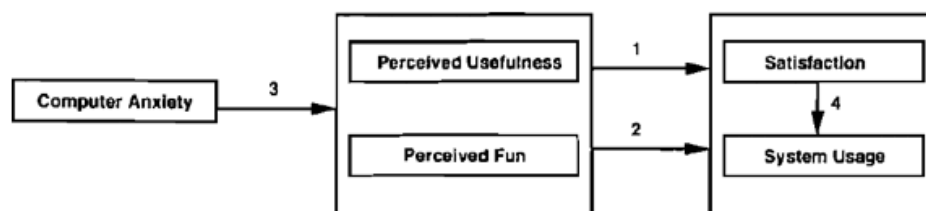
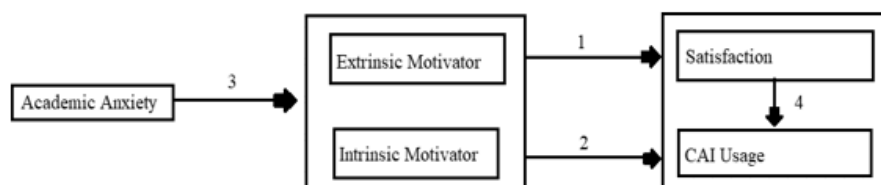


Figure 1.2 Igarria's Model for the use of CAI



Previous research cited in the review of literature shows that technology is one of the factors that can help reduce anxiety in students. With new and developing technological tools, the authors present this question - is the use of CAI or Chatbots related to Academic Anxiety in

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

students? Therefore, we hypothesize that there will exist a correlation between student's use of CAI and Academic Anxiety.

METHODOLOGY

Inclusion Criteria

Students above 18 years of age and below 26 years of age, having an experience of using AI based chatbots for the purpose of academics.

Participant characteristics

Out of 137 respondents there were 80 females, 54 males and 3 others. Out of 137 respondents 97 were from the state of Maharashtra rest were from the other states of India. $M_{age} = 21.4$, $SD_{age} = 1.72$ and $m_{age} = 22.72$ out of 137 respondents were from the field of Art/Humanities, 43 were from science and 20 were from commerce. 2 did not specify the field of education. Out of 137 respondents 131 used ChatGPT followed by GoogleBard, BingAI, Grammarly and Alexa/Google Assistant. Out of 137 respondents 95 had completed Bachelor's followed by highest education being Highschool and Master's. Out of 137 respondents, 59 reported using Chatbots "Sometimes", 42 reported using "Often", 30 reported using "Rarely" and 6 reported using "Always". For Academic Anxiety, $M = 76.65$, $SD = 15.44$ for Females and $M = 66.55$, $SD = 14.41$ for Males. For the Use of Chatbots, $M = 72.53$, $SD = 12.23$ for Females and $M = 74.75$, $SD = 12.77$ for Males.

Sampling procedure

Chain sampling method was used to collect the data using google forms.

Measures

Academic Anxiety Scale by Parihar et al. (2023) that taps into Lack of Confidence, Emotionality, Worry and Interference. The Cronbach's Alpha for this scale was 0.94 that indicates an excellent Alpha value.

Structural Equation Modeling was computed by Malik et al. (2021) in their study in order to find appropriate items to measure the use of Chatbots by university students with reference to learning and education. Items that were used in the study were taken from various scales that tapped into the Perceived usefulness, Perceived ease of use, Perceived convenience, Attitude and Adoption intension vis-à-vis Chatbots. Adoption is the use of technology to complete a goal (Davies, 1989 as cited in Malik et al., 2021). The composite reliability of the scale was above 0.70 that is a value above acceptable range.

Data collection

Data was collected using questionnaire created using Google Form was posted on social media websites such as LinkedIn, Instagram and Twitter. Shared through messaging apps such WhatsApp as well as through Facebook messenger. Researchers even collected the data in the offline mode by meeting with students from different colleges.

Data Diagnostics

After data collection, data was converted into numerical value. Responses on the Likert scale were given the appropriate numerical value associated with the responses. Outliers were detected using Box and whisker plots, after removing the outliers. Variables were checked for normality using Kolmogorov-Smirnov and Shapiro-wilk test for normality.

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

Once, data was found to be normally distributed. Pearson-Product Moment Correlation was computed on the data.

RESULTS

The data analysis was done on SPSS version 27. $n=137$, there were 16 outliers in the sample, after removing them the $n=121$. After removing the outliers, the Shapiro-wilk and Kolmogorov-Smirnov test of normality was computed, and the dataset for Academic Anxiety and use of Chatbots scale were found to be normally distributed. The results for Shapiro-wilk were non-significant at $w=0.98$, $p>0.05$ and $w=0.98$, $p>0.05$ for both the datasets respectively. The results for Kolmogorov-Smirnov were also non-significant at $D=0.07$, $p>0.05$ and $D=0.06$, $p>0.05$ for both the data sets indicating that the data was normally distributed. Histogram and QQ plots indicated the same (Mishra et al., 2019). $M = 74.67$ and $SD = 9.45$ for the Chatbots usability and $M = 74.10$ and $SD = 13.08$ for Academic Anxiety. After all the assumptions of Pearson's product moment correlation were met (Schober et al., 2018). The Pearson correlation coefficient was computed to assess the linear relationship between use of CAI and Academic Anxiety. The results were non-significant, they indicated that there was a weak correlation between the two variables, $r(119) = .06$, $p > .05$ (Mukaka, 2012). Thus, the results were not in line with the hypothesis.

Table 1.1 Descriptive Statistics and Correlations for CAI & AA

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	AA
CAI	121	74.67	9.45	--
AA	121	74.10	13.08	0.06

DISCUSSION

Since the level of Anxiety was only average in the sampling population as indicated by the mean score of the Academic anxiety scale i.e., $M = 74.10$ it is difficult to ascertain if those students who scored high on anxiety had greater use for Chatbots, since even the mean score for the Chatbots usability scale was found to be average at $M = 74.67$. One can say if the target population was strictly those students high on Academic Anxiety, then there could have been a correlation between the use of Chatbots and Academic Anxiety.

There are a few insights from the data, for the Academic Anxiety scale the highest number of people agreed to "I get worried that I will forget whatever I have studied for test/exam.". 69 respondents Agreed and 26 Strongly Agreed out of 137 to the statement which suggests that the students are under immense pressure to just remember what they've learnt. It shows the emphasis of the educational institutions on rote learning rather than imparting education to the students that is not memory based. In the use of Chatbots scale to the question "I will continue using Chatbots" 73 of the respondents Agreed and 22 Strongly Agreed out of 137 respondents. For "I use Chatbots for learning", 72 Agreed and 14 Strongly Agreed out of 137.

These insights show the current stance of Indian students towards the use of Chatbots. They are highly motivated to use the Chatbots in future and they use it for learning. Similar findings are also seen in the earlier studies. In the research by Chen et al. (2022) to understand the use of AI Chatbots to support students' Learning. Findings of the study showed that students perceive Chatbots as a helpful aid to traditional classroom learning to help them study. Our study showed that students from all the streams - Arts/ Humanities,

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

Science, and Commerce, all use CAI showing the drastic influence that the recent advent of conversational chatbot has had on the Indian students.

The authors suggest that there is not a direct correlation between both the variables, hence the results were not significant. However, the variables must be studied along with a mediator variable in order to gain further clarity. Considering there could be another variable influencing their relationship.

Past studies conducted to see the effect of CAI with Anxiety and Depression shows that the use of chatbots does significantly reduce university student's anxiety (Klos et al., 2020). While the study shows use of chatbots to be beneficial in decreasing anxiety among students, the findings do not specifically tap into academic anxiety but deal with anxiety in general. In a study by Han (2020), chatbots were shown to be effective in reducing anxiety and improving performance among Korean middle school students for the purpose of learning English. Toribo's (2023) qualitative research shows that self-regulated learning by students using AI is also beneficial in reducing Academic anxiety. (Crompton et al., 2019 as cited in Adiguzel et al., 2023) also displays the effectiveness of AI in successfully lowering anxiety among middle-school children.

As it can be noted above, AI has played a drastic role in helping students in various domains of academics, however there is a scarcity of quantitative studies exploring the efficacy of CAI in the context of academic anxiety in particular. While it is difficult to place our findings in the current literature due CAI being a recent phenomenon, the literature does promise CAI to bring a positive influence on chatbots in alleviating the academic anxiety of students and should therefore be researched further for its benefits and scope.

Study 2: Relationship of Conversational Artificial Intelligence with Academic Motivations **Introduction**

As our theoretical framework also accounts for Academic Motivation, a secondary study was conducted on a different sample to predict the relationship between Academic Intrinsic and Extrinsic Motivations with the use of CAI.

According to the Self-determination theory, there are three types of motivation. Intrinsic Motivation, Extrinsic Motivation and Amotivation. Intrinsic Motivation entails that students like to learn because it is inherently satisfying and rewarding. Extrinsic Motivation entails that students learn in order to help them get a good job and maintain a good Academic score, for such students learning is just a means to an end. When it comes to Amotivation, it entails that students do not have the motivation to engage in Academic work or even if they do, it's very low effort (Ryan, 2012 as cited in Kotera et al., 2019).

Gottfried (1985) showed that Academic anxiety had a negative correlation with Academic intrinsic motivation, but positive with students' Academic performance and assessments of their Academic competence. Khalaila (2015) found in their study that the detrimental impact of test anxiety on Academic performance was greatly mitigated by intrinsic motivation. Intrinsic Motivation also reduces anxiety related to math in school students (Rubach & Bonanati, 2021). Ariani (2017) found there exists a positive correlation between students' anxiety and Extrinsic Motivation. There was found to be a significant correlation between debilitating anxiety and Extrinsic Motivation (Luo et al., 2020). A significant positive

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

correlation was found between anxiety and Extrinsic Motivation (Coelho & Nascimento, 2020).

The literature therefore suggests that Academic anxiety is inversely related to intrinsic motivation, and positively related with Extrinsic Motivation.

Igbaria et al. (1996) conducted a study on the Motivational Model of Microcomputer Usage. Results strongly supported the idea that perceived usefulness is the primary motivator for microcomputer use compared to perceived fun or social pressure.

Chopra (2019) found that Intrinsic, extrinsic and force choice motivation can influence the use of AI tools by Indian consumers to make shopping decisions. Choi (2020) found that Extrinsic and Intrinsic motivations are significant and positively correlated with the “willingness to accept AI”. Brachten et al. (2021) found that the employees' Intrinsic Motivation has a significant positive impact on their desire to use enterprise bots, but external factors had less of an impact. Fu-Hai et al. (2023) found that the relationships between technological acceptability and self-regulated learning was mediated by intrinsic motivation. Hirzallah and Alshurideh (2023) showed that AI E-innovation technology adoption in the United Arab Emirates was influenced by both internal and external factors.

In this study, we have therefore tried to explore whether the academic motivations of students predict the use of chatbots. Hence, we hypothesize that there will be prediction for the use of CAI by Academic Intrinsic and Extrinsic Motivation. Moreover, we also hypothesize that that Academic Intrinsic Motivation and Academic Extrinsic Motivation independently will be able to predict the use of CAI. Hence, the objective is to study the impact of Academic Motivations on use of CAI or Chatbots, with the adaptation of Igbaria's model.

METHODOLOGY

Inclusion Criteria

Students above 18 years of age and below 26 years of age, having an experience of using AI based chatbots for the purpose of academics.

Participant characteristics

Out of 140 respondents 77 were females and 54 were males, 4 were non-binary and 5 preferred not to disclose their gender. Out of 140 respondents, 101 were from Maharashtra rest were from the other states of India. $M_{age} = 21.4$, $SD_{age} = 1.49$ and $m_{age} = 22$. Out of 140 respondents, 72 respondents were from Arts/Humanities, 44 were from science and 24 from commerce. Out of 140 respondents 100 respondents used ChatGPT followed by Google Assistant, Siri, GoogleBard, BingAI and Grammarly. Out of 140 respondents, 95 respondents had completed Bachelors followed by Master's and Highschool degree. One respondent pursued CS intermediate. Out of 140 respondents, 54 respondents used Chatbots “Sometimes”, 46 respondents used Chatbots “Often”, 13 respondents used Chatbots “Always” and 27 respondents used Chatbots “Rarely”. For Intrinsic Motivation, $M = 31.53$, $SD = 5.46$ for Females and $M = 30.18$, $SD = 6.21$ for Males. For Extrinsic Motivation, $M = 32.93$, $SD = 4.83$ for Females and $M = 31.20$, $SD = 5.24$ for Males. For the Use of Chatbots, $M = 75.31$, $SD = 10.39$ for Females and $M = 77.46$, $SD = 11.45$ for Males.

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

Sampling procedure

Chain sampling was used to collect the data using google forms.

Measures

Scale developed by Malik et al. (2021), which examined the usage of Chatbots for educational purposes among university students. It has composite reliability of greater than 0.70 which is an acceptable coefficient.

Short Version of Academic Motivation Scale by Kotera et al. (2019) in order to measure Academic Intrinsic and Extrinsic Motivation. Internal consistency for the SAMS subscales ranged between 0.63 to 0.85, demonstrating acceptable to mild reliability.

Table 2.1 Alpha value for the subscales of SAMS

Short Academic Motivation Subscales	α
Intrinsic Motivation to Know	0.73
Intrinsic Motivation toward Accomplishment	0.66
Intrinsic Motivation to Experience Stimulation	0.85
Identified Regulation	0.70
Introjected Regulation	0.61
External Regulation	0.78
Amotivation	0.77

Data collection

Google Forms were posted on social media platforms such as Instagram and Twitter, shared through messaging apps such WhatsApp and Facebook messenger.

Data Diagnostics

After data collection, data was converted into numerical value. Responses on the Likert scale were given the appropriate numerical value associated with the responses. Outliers were detected using Box and whisker plots, after removing the outliers. Variables were checked for normality using Shapiro-wilk test for normality, PP plot and Histogram. After residuals were found to be normally distributed. Multiple Linear Regression followed by a Linear Regression was computed on the data.

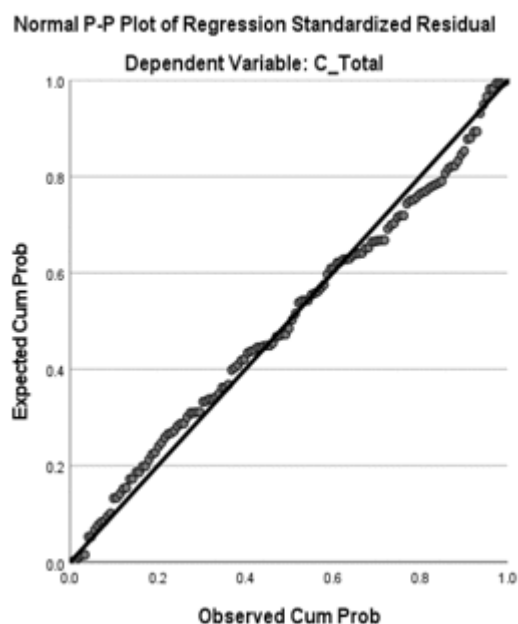
RESULTS

Data analysis was done on SPSS version 27. $n = 140$, there were 3 outliers in the sample that were removed, and the sample size in the final analysis was $n=137$. $M = 76.21$, $SD = 10.68$ for Use of Chatbots, $M = 32.52$, $SD = 4.79$ for Extrinsic Motivation, and $M=31.07$, $SD = 5.98$ for Intrinsic Motivation.

After removing the outliers, the Shapiro-Wilk test of normality was computed, and the dataset for Extrinsic Motivation and Use of Chatbots scale were found to be normally distributed. Histogram and PP plots indicated the same. The results for Shapiro-Wilk were non-significant at $w = 0.98$, $p>0.05$ for Extrinsic Motivation, and $w = .981$, $p> 0.05$ for Use of Chatbots. However, the Intrinsic Motivation dataset was not found to be normally distributed at $w = .923$, $p < 0.01$ (Mishra et al., 2019). Nonetheless, based on the P-P Plot, the residuals of the regression analysis followed a normal distribution, hence multiple linear regression analysis was performed on the data (Habeck & Brickman, 2018).

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

Figure 1.1: P-P Plot



Pearson’s product moment correlation was calculated between the 3 variables. A moderate correlation was obtained between the 2 predictor variables, Intrinsic and Extrinsic Motivation, $r(135) = 0.381, p < 0.01$. A weak but significant correlation was also obtained between Extrinsic Motivation and the Use of Chatbots, $r(135) = 0.186, p < 0.05$, however there was a weak and non-significant correlation between Intrinsic Motivation and the Use of Chatbots, $r(135) = 0.102, p > 0.05$.

A multiple linear regression was computed to predict the use of Chatbots by students based on Academic intrinsic and Extrinsic Motivation. All the assumptions of regression were met apart from the normality of the distribution of the Intrinsic Motivation Dataset. The model overall predicts 3.6% of variation in the use of Chatbots and is not significantly useful in explaining the chatbot use by students, $F(2,134) = 0.87, p > 0.05$. With a one-unit increase in Extrinsic Motivation, the use of chatbot increases by .172, and with a one-unit increase in Intrinsic Motivation, the use of chatbot increases by only 0.036 (Zaid, 2015).

Table 2.2 Multiple Linear Regression between Academic Motivation & Use of Chatbots

Variable	Beta	SE	<i>t</i>	<i>p</i>	95% CI
EM	0.39	0.2	.172	0.062	[-0.020, 0.789]
IM	0.07	0.16	0.036	0.692	[-0.259, 0.389]

A secondary analysis was done, based on the findings of the previous regression model. A Pearson correlation and linear regression was calculated to predict Use of Chatbots based on Academic Extrinsic Motivation. For Pearson correlation the results were significant, the results indicated that there was a weak correlation between the two variables, $r(135) = .18, p < .05$ (Mukaka, 2012). A significant regression equation was also found $F(1,135) = 4.855, p < .05$, with an R^2 of 0.035. The following can be used to predict students’ Academic Motivation with the use of Chatbots: $62.704 + 0.415 (\text{Academic Extrinsic Motivation})$. Use

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

of Chatbots increased 0.415 for each unit of increase in Academic Extrinsic Motivation of students (Zaid, 2015).

Table 2.3 Linear Regression between Extrinsic Motivation & Use of Chatbots

Variable	Beta	SE	<i>t</i>	<i>p</i>	95% CI
EM	0.42	0.19	2.203	0.029*	[0.043, 0.79]

Note. *significant, $p < 0.05$

The hypothesis that Extrinsic Academic Motivation would be a factor that could predict the use of chatbots was retained.

DISCUSSION

The Igarria's model for technology acceptance that the authors had adapted to explain the use of Chatbots in students was not proven wrong despite non-significant results in the first analysis. Considering secondary analysis showed that Extrinsic Motivation is a weak but a significant predictor for the Use of Chatbots, it aligns with the theoretical model that states that Extrinsic Motivation or perceived usefulness will predict the Use of Chatbots more than perceived fun.

The findings also showed that there was a moderate correlation between Extrinsic Motivation and Intrinsic Motivation, similar findings have also been reported earlier in the literature. Ajmal et al. (2021) found a moderate correlation between Intrinsic and Extrinsic Motivation in students. It shows that both the motivations can co-exist and they are not mutually exclusive. Even though students may have Intrinsic Motivation to study or go to college because of the inert satisfaction, a degree of Extrinsic Motivation is also associated with it such as wanting a good job or a good salary package.

General Discussion

Extrinsic Motivation being a significant predictor for the Use of Chatbots as shown in the secondary analysis brings new insights into the domain of the Use of Chatbots or CAI, it shows Academic Extrinsic Motivation can be one of the factors associated with students' use of Chatbots such as ChatGPT, GoogleBard or BingAI in educational sphere. Same goes for Academic Intrinsic Motivation not being a significant predictor for Use of Chatbots. It shows that if students are Intrinsically motivated to pursue their coursework, they are less likely to make Use of Chatbots.

In the literature, Extrinsic Motivation has been found to be positively correlated with anxiety in students (Liu et al., 2022). That again opens up the possibility of students using Chatbots because of their Academic Anxiety, if their Academic Anxiety is less, then their use of Chatbots will also decrease. Feedback obtained from the respondents show that students are more likely to use Chatbots in Academics for the purpose of summarizing a paper, generating a program code or solving a mathematical problem, all of which could help them to get higher grades or performing better in their coursework, leading to greater Academic and eventually career success, all of which are extrinsically motivated.

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

Implications

There exists a gap in the literature that has not yet explored the link between the students' use of CAI and level of Academic anxiety. This research is the one of the first in the literature to bridge the gap. Furthermore, the second study also studied the influence of Academic Motivations on the use of CAI using Igarria's Model. The study could help with the further understanding of the motivational processes involved in the acceptance of Chatbots by students.

The study highlights the need to shift from a system of rote learning that is generally seen in Indian educational institutions and accept the new, developing technology in order to create effective learning environments for students. There is also a need to understand that new technology and the young generation of students cannot be separated from each other, hence discouraging students from exploring and using the aid of new technology could impair relations between educational institutions, educators and students.

Limitations

For both the studies the research questionnaire was deemed too lengthy by some of the participants. There was fatigue due to the same as reported by participants, hence fatigue effect could've affected the responses and it could also be the case that participants were not in the appropriate mindset to give accurate responses. The scale of the Academic Anxiety had various items that were very extreme in nature, that are not usually found in the average population. The sample for both the studies were more representative of the state of Maharashtra; while responses were also gathered from other states of India, they were still lesser in comparison to the number of responses gathered from Maharashtra, more specifically the city of Mumbai. Dataset for Intrinsic Motivation for the second study was not normally distributed. Though a regression model is flexible to the violations of assumption of normality for the predictor variables, this could have been a factor affecting the results of the regression analysis. The instrument used for both the studies could be considered as a basic scale measuring the use of Chatbots, when the scope of the study required a more specific scale that tapped into the use of conversational Chatbots by students.

One of the major methodological limitations identified by the authors was the separation of data collection across 2 studies – the first one focusing on academic anxiety and use of chatbots, while the second one was directed toward finding the relationship between Academic Motivation and use of chatbots. Since data was collected across 2 different samples, we couldn't opt for an advanced level of analysis that could be performed on the data we had collected and neither could we test the theory in the first study itself.

Suggestions for future research

In the light of above findings, the authors propose that future studies could explore the relationship between Academic Anxiety and the Use of Chatbots, mediated by Academic Extrinsic Motivation. In recent years, technology has been growing immensely and so has the Academic competition to be better than everyone, hence the link between students and technology will increasingly become stronger. Therefore, longitudinal studies focusing on a long-term development of technology related factors and academically relevant variables is required. Future studies could also construct an instrument to measure the use of conversational Chatbots in order to obtain better validity of results.

CONCLUSION

The first study showed insignificant results, the results were not in line with the hypothesis. There was a very low, insignificant correlation between Academic Anxiety and the Use of Chatbots or CAI. Reason could be attributed due to the lack of presence of other significant variables that were not taken into the consideration by the researchers. The results of the second study, show that Academic Extrinsic Motivation is a possible predictor for the Use of Chatbots or C.A.I by students as shown by the significant correlation in the secondary analysis. Chatbots act as a personal tutor, as a method of revising old concepts, exploring new areas of interests and educators can help students use Chatbots in an effective manner that helps them and create a conducive, chatbot-aversion free environment.

REFERENCES

- Abramson. (2023, June 1). *How to use ChatGPT as a learning tool*. American Psychological Association. Retrieved June 19, 2023, from <https://www.apa.org/monitor/2023/06/chatgpt-learning-tool>
- Adamopoulou, E., & Moussiades, L. (2020). An overview of Chatbot technology. In *IFIP advances in information and communication technology* (pp. 373–383). https://doi.org/10.1007/978-3-030-49186-4_31
- Adiguzel, T., Kaya, M. H., & Cansu, F. K. (2023). Revolutionizing education with AI: Exploring the transformative potential of ChatGPT. *Contemporary Educational Technology, 15*(3), ep429. <https://doi.org/10.30935/cedtech/13152>
- Ajmal, M. (2021). Exploring the role of motivation in English language teaching: Learners and Teachers perspective. *Psychology, 58*(1), 534–545. <https://doi.org/10.17762/pae.v58i1.804>
- APA Dictionary of Psychology. (n.d.). *APA Dictionary of Psychology*. <https://dictionary.apa.org/>
- Ariani, D. W. (2017). Self-determined motivation, achievement goals and anxiety of economic and business students in Indonesia. *Educational Research and Reviews, 12*(23), 1154–1166. <https://doi.org/10.5897/err2017.3381>
- Arora, N. (2022). MENTAL HEALTH OF ADOLESCENTS IN RELATION TO THEIR ACADEMIC ANXIETY. *International Journal of Research in Social Sciences and Humanities, 12*(01), 661–673. <https://doi.org/10.37648/ijrssh.v12i01.034>
- Attri, A. K., & Neelam. (2013). ACADEMIC ANXIETY AND ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS – A STUDY ON GENDER DIFFERENCES. *INTERNATIONAL JOURNAL OF BEHAVIORAL SOCIAL AND MOVEMENT SCIENCES, 2*(1). <https://ijobsms.org/index.php/ijobsms/article/view/84>
- Azhari, S. C., Saepulmilah, C., & Meita, T. (2022). Development of Literature Academic Anxiety From 2002-2021: A Bibliometric Analysis Approach. *Indonesian Journal Education, 1*(1), 1–10. <https://doi.org/10.56495/ije.v1i1.171>
- Bhuttah, T. M., Nadeem, S., Shahid, N. A., & Sarwat, S. (2021). THE INFLUENCE OF TECHNOLOGY AS A MEDIATOR ON THE RELATIONSHIP BETWEEN STUDENTS' ANXIETY AND ENGAGEMENT. *Humanities & Social Sciences Reviews, 9*(3), 893–901. <https://doi.org/10.18510/hssr.2021.9387>
- Biswas, S. (2023). Role of Chat GPT in Education. *Available at SSRN 4369981*.
- Brachten, F., Kissmer, T., & Stieglitz, S. (2021). The acceptance of Chatbots in an enterprise context – A survey study. *International Journal of Information Management, 60*, 102375. <https://doi.org/10.1016/j.ijinfomgt.2021.102375>

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

- Chen, Y., Jensen, S. A., Albert, L. J., Gupta, S., & Lee, T. (2022). AI (AI) Student assistants in the classroom: Designing Chatbots to support student success. *Information Systems Frontiers*, 25(1), 161–182. <https://doi.org/10.1007/s10796-022-10291-4>
- Choi, Y. (2021). A study of employee acceptance of AI technology. *European Journal of Management and Business Economics*, 30(3), 318–330. <https://doi.org/10.1108/ejmbe-06-2020-0158>
- Chopra, K. (2019). Indian shopper motivation to use AI. *International Journal of Retail & Distribution Management*, 47(3), 331–347. <https://doi.org/10.1108/ijrdm-11-2018-0251>
- Coelho, W. E., & Nascimento, E. M. (2021). Anxiety in Accounting Graduate. *Revista de Contabilidade e Organizações*, 15.
- Cunningham-Nelson, S., Boles, W., Trouton, L., & Margerison, E. (2019). A Review of Chatbots in Education: Practical Steps Forward. *30th Annual Conference for the Australasian Association for Engineering Education (AAEE 2019): Educators Becoming Agents of Change: Innovate, Integrate, Motivate.*, 299–306.
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
- Fulmer, R., Joerin, A., Gentile, B., Lakerink, L., & Rauws, M. (2018). Using Psychological AI (TESS) to relieve symptoms of depression and anxiety: randomized controlled trial. *JMIR Mental Health*, 5(4), e64. <https://doi.org/10.2196/mental.9782>
- Gottfried, A. E. (1985). Academic Intrinsic Motivation in elementary and junior high school students. *Journal of Educational Psychology*, 77(6), 631–645. <https://doi.org/10.1037/0022-0663.77.6.631>
- Habeck, C., & Brickman, A. M. (2018). A common statistical misunderstanding in Psychology and Neuroscience: Do we need normally distributed independent or dependent variables for linear regression to work? *bioRxiv* (Cold Spring Harbor Laboratory). <https://doi.org/10.1101/305946>
- Hamada, S., AlShibli, M., & Hamada, S. (2023, May). NEW TRENDS IN TECHNOLOGY AND CHAT BOTS. In *PROCEEDING OF INTERNATIONAL CONFERENCE ON EDUCATION, SOCIETY AND HUMANITY* (Vol. 1, No. 1, pp. 51-58).
- Han, D. (2020). The effects of voice-based AI Chatbots on Korean EFL middle school students' speaking competence and affective domains. *Asia-Pacific Journal of Convergent Research Interchange*, 6(7), 71–80. <https://doi.org/10.47116/apjcri.2020.07.07>
- Hariri, W. (2023). Unlocking the Potential of ChatGPT: A Comprehensive Exploration of its Applications, Advantages, Limitations, and Future Directions in Natural Language Processing. *arXiv (Cornell University)*. <https://doi.org/10.48550/arxiv.2304.02017>
- Hirzallah, M. N. Y., & Alshurideh, M. (2023). The effects of the internal and the external factors affecting AI (AI) adoption in e-innovation technology projects in the UAE? Applying both innovation and technology acceptance theories. *International Journal of Data and Network Science*, 7(3), 1321–1332. <https://doi.org/10.5267/j.ijdns.2023.4.006>
- Hooda, M., & Saini, A. (2017). Academic anxiety: An overview. *Educational Quest*, 8(3), 807-810.
- Hsu, T. C., Huang, H. L., Hwang, G. J., & Chen, M. S. (2023). Effects of Incorporating an Expert Decision-making Mechanism into Chatbots on Students' Achievement, Enjoyment, and Anxiety. *Educational Technology & Society*, 26(1), 218-231

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

- Hu, B., Mao, Y., & Kim, K. J. (2023). How social anxiety leads to problematic use of conversational AI: The roles of loneliness, rumination, and mind perception. *Computers in Human Behavior, 145*, 107760. <https://doi.org/10.1016/j.chb.2023.107760>
- Hwang, G., & Chang, C. (2021). A review of opportunities and challenges of Chatbots in education. *Interactive Learning Environments, 1–14*. <https://doi.org/10.1080/10494820.2021.1952615>
- Igbaria, M., Parasuraman, S., & Baroudi, J. J. (1996). A motivational model of microcomputer usage. *Journal of Management Information Systems, 13(1)*, 127–143. <https://doi.org/10.1080/07421222.1996.11518115>
- Igbaria, M., Schiffman, S. J., & Wieckowski, T. J. (1994). The respective roles of perceived usefulness and perceived fun in the acceptance of microcomputer technology. *Behaviour & Information Technology, 13(6)*, 349–361. <https://doi.org/10.1080/01449299408914616>
- Khalaila, R. (2015). The relationship between Academic self-concept, intrinsic motivation, test anxiety, and Academic achievement among nursing students: Mediating and moderating effects. *Nurse Education Today, 35(3)*, 432–438. <https://doi.org/10.1016/j.nedt.2014.11.001>
- Kim, H., Kim, N. K., & Cha, Y. (2021). Is It Beneficial to Use AI Chatbots to Improve Learners' Speaking Performance? *The Journal of Asia TEFL, 3(18)*, 10.161. <https://doi.org/10.18823/asiatefl.2021.18.1.10.161>
- Klos, M. C., Escoredo, M., Joerin, A., Lemos, V., Rauws, M., & Bunge, E. L. (2021). AI-Based Chatbot for anxiety and Depression in university Students: pilot Randomized controlled trial. *JMIR Formative Research, 5(8)*, e20678. <https://doi.org/10.2196/20678>
- Kotera, Y., Conway, E., & Green, P. (2023). Construction And factorial validation of a short version of the Academic Motivation Scale. *British Journal of Guidance & Counselling, 51(2)*, 274-283.
- Liu, C., Yan, S., & Wang, Y. (2022). Self-Determination Theory in Education: The Relationship between Motivation and Academic Performance of Primary School, High School, and College Students. *Advances in Social Science, Education and Humanities Research*. <https://doi.org/10.2991/assehr.k.220704.167>
- Luo, Z., Subramaniam, G., & O'STEEN, B. I. L. L. Y. (2020). Will anxiety boost motivation? The relationship between anxiety and motivation in foreign language learning. *Malaysian Journal of ELT Research, 17(1)*.
- Mahato, B., & Jangir, S. (2012). A study on Academic anxiety among adolescents of Minicoy Island. *International Journal of Science and Research, 1(3)*, 12-14.
- Malik, R., Shma, A., Trivedi, S., & Mishra, R. (2021, September 20). Adoption of Chatbots for Learning among University Students: Role of Perceived Convenience and Enhanced Performance. *International Journal of Emerging Technologies in Learning (IJET), 16(18)*, 200. <https://doi.org/10.3991/ijet.v16i18.24315>
- Malik, R., Shrama, A., Trivedi, S., & Mishra, R. (2021). Adoption of Chatbots for Learning among University Students: Role of Perceived Convenience and Enhanced Performance. *International Journal of Emerging Technologies in Learning (Ijet), 16(18)*, 200. <https://doi.org/10.3991/ijet.v16i18.24315>
- Mishra, P., Pandey, C. K., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia, 22(1)*, 67. https://doi.org/10.4103/aca.aca_157_18

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

- Mukaka, M. M. (2012). A guide to appropriate use of correlation coefficient in medical research. *Malawi medical journal*, 24(3), 69-71.
- Parihar, A., Moirangthem, B., Mehmi, M., Ningthoujam, N., Kapfo, N., Wani, M. A., & Saha, A. (2023). DEVELOPMENT AND VALIDATION OF ACADEMIC ANXIETY SCALE. *European Chemical Bulletin*, 12(5). <https://doi.org/10.48047/ecb>
- Rehman, A. U. (2016). Academic anxiety among higher education students of India, causes and preventive measures: An exploratory study. *International journal of modern social sciences*, 5(2), 102-116.
- Romanovskyi, O., Pidbutska, N., & Knysh, A. (2021). Elomia Chatbot: The effectiveness of AI in the fight for mental health. *COLINS*, 1215–1224. <http://ceur-ws.org/Vol-2870/paper89.pdf>
- Rubach, C., & Bonanati, S. (2021). The impact of parents' home- and school-based involvement on adolescents' Intrinsic Motivation and anxiety in math. *Psychology in the Schools*, 60(6), 1615–1635. <https://doi.org/10.1002/pits.22577>
- Rudolph, J., Tan, S., & Tan, S. (2023). War of the Chatbots: Bard, Bing Chat, ChatGPT, Ernie and beyond. The new AI gold rush and its impact on higher education. *Journal of Applied Learning and Teaching*, 6(1). <https://doi.org/10.37074/jalt.2023.6.1.23>
- Ryan, R. M. (2012). The Oxford Handbook of Human Motivation. In *Oxford University Press eBooks*. <https://doi.org/10.1093/oxfordhb/9780195399820.001.0001>
- Schober, P., Boer, C., & Schwarte, L. A. (2018). Correlation Coefficients: appropriate use and interpretation. *Anesthesia & Analgesia*, 126(5), 1763–1768. <https://doi.org/10.1213/ane.0000000000002864>
- Shahroui, E. A. (2016). Sources of Academic anxiety among undergraduate students-contemporary study between private and government universities. *Journal of Emerging Trends in Educational Research and Policy Studies*, 7(2), 118-124.
- Song, X., & Xiong, T. (2021). *A Survey of Published Literature on CAI*. <https://doi.org/10.1109/icim52229.2021.9417135>
- Taherdoost, H. (2018). A review of technology acceptance and adoption models and theories. *Procedia Manufacturing*, 22, 960–967. <https://doi.org/10.1016/j.promfg.2018.03.137>
- Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., & Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using Chatbots in education. *Smart Learning Environments*, 10(1). <https://doi.org/10.1186/s40561-023-00237-x>
- Toribio, N. F. (2023). Analysis Of Chatgpt and Other AI's Ability to Reduce Anxiety of Science-Oriented Learners In Academic Engagements. *Journal of Namibian Studies: History Politics Culture*, 33, 5320-5337.
- Vaidyam, A., Wisniewski, H., Halamka, J., Kashavan, M. S., & Torous, J. (2019). Chatbots and Conversational Agents in Mental Health: A Review of the Psychiatric Landscape. *The Canadian Journal of Psychiatry*, 64(7), 456–464. <https://doi.org/10.1177/0706743719828977>
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 52(4), 1003–1017. <https://doi.org/10.1177/0013164492052004025>
- Wang, Y. (2023). Analysis of the Influence of Academic Anxiety and Family Capital on Students' Academic Performance from the Perspective of Peer Effect in China. *Journal of Education, Humanities and Social Sciences*, 15, 111-118.
- Zaid. (2015). *Correlation and Regression Analysis*. Organisation of Islamic Cooperation.

Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students

Acknowledgment

To Dr. Umesh Bharte, Associate professor at University Department of Applied Psychology, University of Mumbai for patiently guiding us throughout our research process.

Conflict of Interest

The author(s) declared no conflict of interest.

How to cite this article: Bora, N. & Thokan, S. (2023). Relationship of Conversational Artificial Intelligence with Academic Anxiety and Academic Motivations in Indian Students. *International Journal of Indian Psychology*, 11(4), 1988-2005. DIP:18.01.183.20231104, DOI:10.25215/1104.183

APPENDIX

Table A Correlation Matrix for Multiple Regression Model for Academic Motivation (EM, IM) and use of Chatbots (CAI)

	Variable	Mean	SD	N	1	2
1	CAI	76.21	10.68	137		
2	EM	32.52	4.79	137	.186	
3	IM	31.07	5.98	137	.102	.381**

**correlation is significant at 0.01 level

Table B Correlation Matrix for Linear Regression Model for Extrinsic Motivation (EM) and Use of Chatbots (CAI)

	Variable	Mean	SD	N	1
1	CAI	76.21	10.68	137	
2	EM	32.52	4.79	137	.186*

*correlation is significant at 0.05 level