

## Students Perception and Preference of the Application of Artificial Intelligence (AI) in Higher Education: A Metacognitive Exploration

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### ABSTRACT

Artificial Intelligence (AI) is a technological advancement and a potential game-changer innovation in the field of education as well as all sectors of human life. It is present in our lives and is progressing efficiently in modern times. The start of AI is often derived from the 1956 Dartmouth Summer scientific research on computer science. The common understanding the Artificial Intelligence is the ability to “perform cognitive tasks” that are normally associated with human thinking, in particular in problem-solving and learning. Through this empirical study, researchers know the student’s perception and preference towards Artificial Intelligence. Based on the self-made attitude scale researchers explored attitudinal differences among the male, female, urban, rural, and their Stream. The application of AI in education is a new footstep for the generation alpha. Nowadays, students use several AI tools like ChatGPT (generates dialogue created by open AI), Grammarly (reviews spelling, grammar, and punctuation, detects plagiarism, etc.), Tutor AI (connects students with qualified tutors), QuillBot (online writing platform), Duolingo (language learning application), Education Copilot (platform for lesson plans, writing prompts, students reports, and project outlines), Curipod (interactive presentation tool for making lessons) etc. are the most famous AI tools in educational purposes.

**Keywords:** *Perception, Preferences, Application of Artificial Intelligence (AI), Higher Education, Metacognitive, Exploration*

Artificial Intelligence (AI) is a technological advancement and a potential game-changer in education. It is present in our lives and is progressing efficiently in modern times. The start of AI is often derived from the 1956 Dartmouth Summer scientific research on computer science. One definition of Artificial Intelligence (AI) is computers’ ability to “perform cognitive tasks” that are normally associated with human thinking, in particular in problem-solving and learning. AI is gaining rapid response in all aspects of human life. Day-to-day life has changed since the wide-spreading adaptability of AI. Through AI tools and techniques, researchers and AI scientists are trying to make human life more comfortable and technologically advanced. AI application in education is usually called AIED. AI in education can replace a tutor or instructor, improve the tutor-student relationship,

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## Students Perception and Preferences of the Application of Artificial Intelligence (AI) in Higher Education: A Metacognitive Exploration

and/or act as a fellow student to facilitate one’s learning through collaborative learning or through tutoring of a less knowledgeable student. There are various applications of AI in education, including content design, delivery, assessment, feedback, and support. In terms of content design, AI can enable the design of content that is friendly and flexible. In terms of delivery of contents, AI enables delivery of contents more efficiently and flexibly by substituting classroom instruction and providing support for students to learn from anywhere in the world at any time. In terms of assessment, AI can enable automated assessment, for feedback and support, it is generally agreed that for learners, timely, relevant, and objective feedback is very important. According to National Education Policy 2020, AI should be introduced to and included in the regular education curriculum. AI is being incorporated into the curriculum to improve efficiency, personalize learning, and streamline administrative processes so that teachers have more time and freedom to impart knowledge and flexibility. Artificial Intelligence (AI) creates an encouraging environment, especially, can provide a favorable context for students learning characteristics and processes. Artificial Intelligence consists of all forms of electronically reinforced learning, processing, and teaching. The easy and flexible structure of these AI-influenced environments empowers learners to accommodate their personal needs in their own time learning. One of the key elements of Artificial Intelligence is the ability to learn. Intelligent systems are designed to learn from data and experiences, identify patterns and trends, and improve their performance over time. The main aim of aim education is to facilitate learners with flexible, personalized, and engaging learning along with the basic automated task. Many examples of successful AI-powered educational tools and platforms are currently in use. Some of the most popular are: Duolingo is a language learning app that uses AI to personalize lessons for each user. ALEKS is an AI-powered math learning platform that provides adaptive assessment and personalized learning plans. Coursera uses AI to recommend courses to students based on their interests and previous learning history. ChatGPT (Chat Generative Pre-Trained Transformer) is a large language model-based chatbot developed by Open AI and launched on November 30, 2022, that enables users to refine and steer a conversation towards a desired length, format, style, level of detail, and language.

**Table 1: Tabular Expression of Literature Review:**

Author Name and Year of Publication	Research Title	Research Aim	Research Methods	Research Findings
Borchetia & Hazarika, 2024	Artificial Intelligence in Education: An Overview	To study the need for AI in education and its various challenges.	Systematic review	AI has a significant potential to provide a personalized and flexible learning environment for pupils and teachers. The NEP-2020 also emphasizes AI-powered learning platforms as well as remote learning tools. There are many challenges, such as technical expertise, the cost of AI tools, data protection, etc.
Alzahrani, 2023	Analysing Students’ Attitudes and Behavior Toward Artificial Intelligence Technologies	To explore the factors that impact Artificial Intelligence on higher education	Questionnaire survey method.	Based on the structural equation model results, factors of performance expectancy and facilitating conditions significantly influenced students' attitudes and behavioral intentions toward using AI in the higher education sector. In comparison, effort expectancy

## Students Perception and Preferences of the Application of Artificial Intelligence (AI) in Higher Education: A Metacognitive Exploration

	in Higher Education			does not significantly influence attitudes towards AI in higher education.
Zhu & Ren, 2022	Analysis of the Effect of Artificial Intelligence on Role Cognition in the Education System.	To analyze the effect of Artificial Intelligence on role cognition in Taiyuan City's education system.	Questionnaire survey method.	The learning of AI-assisted courses is dependent on course role cognition.
Yesmin & Alom, 2022	A study on Artificial Intelligence and its Impact on Education.	To study the impact of AI in education and the various challenges therein.	Systematic review	AI can improve the quality and quantity of teaching-learning experiences and help foster the skills needed to shape the future.
Chatterjee & Bhattacharjee, 2020	Adoption of Artificial Intelligence in higher education: a quantitative analysis using structural equation and potential modeling.	To explore the techniques that users would be able to adopt Artificial Intelligence techniques in India.	Research survey	Their perceived risk and effort expectancy drastically affect the attitude of stakeholders toward adopting AI. It's also noted that performance expectancy has a confined impact on stakeholders' attitudes.
Jain & Jain, 2019	Role of Artificial Intelligence in Higher Education- An Empirical Investigation	To find out how the concept of artificial intelligence can be employed in teaching and learning in higher education and the impact of its use in higher education.	Questionnaire survey method	Adopting AI in higher education institutes can greatly foster students' learning capacities, and AI apprehends onerous prospects in the sector.

### LITERATURE REVIEW BASED ON TREND ANALYSIS

The researchers conducted a review of related literature from 2019-2024 and classified the literature review into two perspectives: one is a research study carried out on the application of AI in the educational sector, and another perspective is the application of AI in other sectors such as banking and finance, medical, industries, defense, transport and delivery sector, and so on. In 2019, Jain & Jain carried out a study on the 'Role of Artificial Intelligence in Higher Education Empirical Investigation'; the researchers found that incorporating AI in higher educational institutions can foster the learning capacities of students. In another study in 2019,

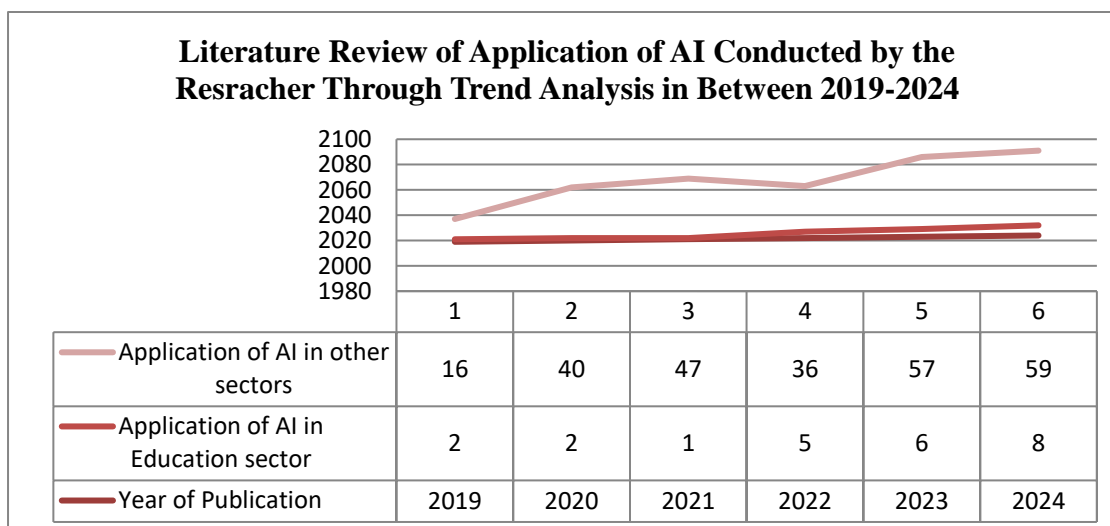
## **Students Perception and Preferences of the Application of Artificial Intelligence (AI) in Higher Education: A Metacognitive Exploration**

Richter, Morin & Gouverneur conducted a study on ‘Systematic Review of Research on Artificial Intelligence Applications in Higher Education -Where Are the Educators’. This study explores an overview of AI applications in higher education from 2007 to 2018. This study revealed that most of the disciplines involved in the study come from Computer Science and STEM. Most academic support and institutional and administrative research studies focus on four spectrums: profiling and prediction, assessment and evaluation, adaptive systems and personalization, and intelligent tutoring systems. In 2020, Chatterjee & Bhattacharjee researched ‘Adoption of Artificial Intelligence in Higher Education: A Quantitative Analysis Using Structural Equation and Potential Modeling.’ The finding showed that the perceived risk and effort expectancy drastically affect the attitude of stakeholders toward the adoption of AI. In 2021, Seo & Tang & Yoon researched ‘The Impact of Artificial Intelligence on Learner-Instructor Interaction in Online Learning’. The finding revealed that adopting AI systems in online learning can possess instructor-learner interaction at a massive level but can violate social boundaries. Another study in 2022 by Yesmin & Alom in their paper ‘A study on Artificial Intelligence and its Impact on Education’ mentioned that AI can improve both the quality and quantity of teaching-learning experiences and can help to increase the skills needed to shape the future. In 2023, Alzahrani conducted a study on ‘Analyzing Students’ Attitudes and Behavior toward Artificial Intelligence Technologies in Higher Education’. The findings showed that on the basis of structural equation model results, factors of performance expectancy and facilitating conditions significantly influenced students’ attitudes and their behavioral intention to the use of AI in the higher education sector as well as the effort expectancy does not significantly influence attitudes towards AI in higher education 2024 Nadir conducted a study on ‘The Level of Awareness and Perception of University Students towards Artificial Intelligence in Higher Studies’. The findings showed that the kinship between AI and human interaction can lead to fostering efficiency, personalized learning experiences, and refined administrative processes.

In non-educational sectors, there is so much research work conducted on the application of Artificial Intelligence. In 2019 Karabegovic & Karabegovic conducted a study on ‘The Role of Collaborative Service Robots in the Implementation of Industry 4.0’, in 2020 Balushi & Goel carried out a study on ‘The Development of Robotic Process Automation (RPA) For the Efficiency of Bank Office Operations at Bank Muscat’, in 2021 Liu & Lu & Zhang & Ye conducted a study on Application of Artificial Intelligence in Medicine: An Overview, in 2022 Frau carried out a study on ‘Unmanned Military Systems and Autonomous Weapons Systems’, in 2023 Sokingh & Lian & Torshin conducted a study on ‘A Survey of Recent Advances in Artificial Intelligence’, and in 2024 Liyanage & Dia & Ducan & Abduljabbar conducted a study on ‘Evaluation of the Impacts of On-Demand Bus Services Using Traffic Simulation.

Hence, the researchers selected this study in a regional perception based on researcher knowledge and extensive literature review and found the very least number of kinds of literature carried out in West Bengal. Therefore, the researcher selected this study-to-study students' perceptions and awareness of artificial intelligence in higher education. Now, scientists and educationists are talking about incorporating AI into education, particularly higher education, which is essential and emerging.

## Students Perception and Preferences of the Application of Artificial Intelligence (AI) in Higher Education: A Metacognitive Exploration



**Fig (1):** Source: Research Gate, Google Scholar, Online Open Access Journals (2019-2024)

**Statement of the Problem:** The above problem is titled ‘*Students Perception and Preference of Artificial Intelligence (AI) in Higher Education: A Metacognitive Exploration*’.

### ***Delimitation of the study***

- This study is confined to students' perceptions and preferences regarding AI in higher education.
- This study was conducted only by Undergraduate, Post Masters, and professional courses (B.Ed.) students.
- This study is confined only to the Purulia district of West Bengal.

### ***Objectives of the study***

- To find out the perception and preference differences regarding the application of AI with respect to their gender (Male/Female).
- To study the differences in perception and preference toward AI among urban and rural higher education students.
- To determine the perceptions and preferences difference toward AI among the Arts and Science students in higher education.

### ***Hypotheses of the study***

- There is no significant difference in perception and preference towards applying Artificial Intelligence among male and female higher education students.
- There is no significant difference in perception and preference for applying Artificial Intelligence among urban and rural higher education students.
- There is no significant difference in perception and preference for applying artificial intelligence among higher education students in their streams.

## **METHODOLOGY OF THE STUDY**

### ***Nature of the study:***

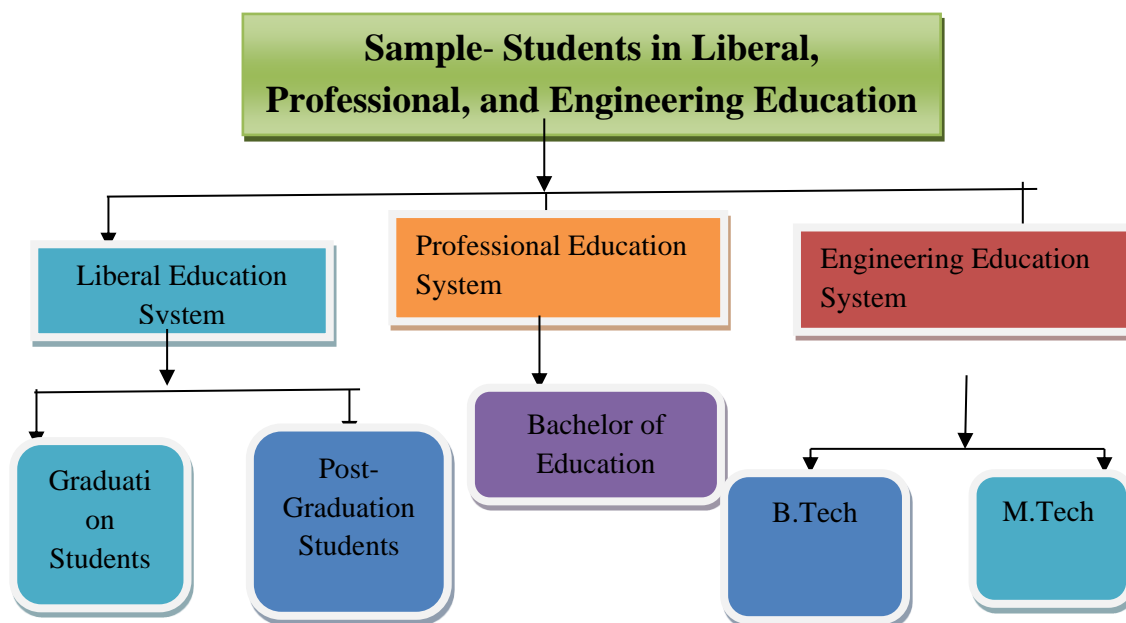
This study is descriptive-cum survey type in which data are primarily based on primary data. The researchers collected the data with the help of a five-point Likert-type questionnaire through the Google form.

## Students Perception and Preferences of the Application of Artificial Intelligence (AI) in Higher Education: A Metacognitive Exploration

### *Population of the study:*

The researchers consider all higher education students (Under Graduation, Post Graduation, and Professional courses (B.Ed.) in this study and Technical Education (B. Tech, M.Tech) students of the Purulia district as a population.

**Sample and Sampling Design of the study:** Using Stratified random sampling, the researchers selected only 100 samples from the entire population.



**Fig (2):** Diagram of the Sample of the Study

**Table 2:** Number of Sample Size with Institutions based on Area





Level of Education System	Types	Rural	Urban	Total (N=100)
Liberal Education System	Graduation	28	16	44
	Post Graduation	5	2	7
Professional Education System	B.Ed.	22	22	44
Engineering Education System	B.Tech	1	2	3
	M.Tech	1	1	2

**Tools used for the data collection:** The researchers prepared a Likert-type questionnaire to collect suitable data.

**Statistical Treatment:** The researchers have expressed and interpreted the data using various statistical techniques, such as t-test, mean, and SD, and a graphical representation of data, such as Bar graphs.

**Students Perception and Preferences of the Application of Artificial Intelligence (AI) in Higher Education: A Metacognitive Exploration**

**Table-3: Methodological Diagram**

Objectives 	Hypothesis 	Nature of study 	Data collection device to be used 	Statistical techniques will be used
To find out the perception and preference differences regarding the application of AI regarding gender (Male/Female).	There is no significant difference in perception and preference regarding the application of Artificial Intelligence among male and female higher education students.	Quantitative	Self-made Questionnaire	Mean, SD, t-test
To study the perception and preference differences toward AI among urban and rural higher education students	There is no significant difference in perception and preference of Artificial Intelligence's application among urban and rural higher education students.	Quantitative	Self-made Questionnaire	Mean, SD, t-test
To determine the perception and preference differences toward AI among the Arts and Science students in higher education	There is no significant difference in perception and preference among higher education students regarding applying artificial intelligence in their streams.	Quantitative	Self-made Questionnaire	Mean, SD, t-test

**Objectives-wise Data Analysis and Interpretations:**

Here, the researchers analyse the data in three sections:

**Section-1: Objective 1: To determine the higher education students' perception and preference towards Artificial Intelligence.**

In this objective fulfillment, the researchers set three null hypotheses and then different the two means by t-test. The null hypothesis is:

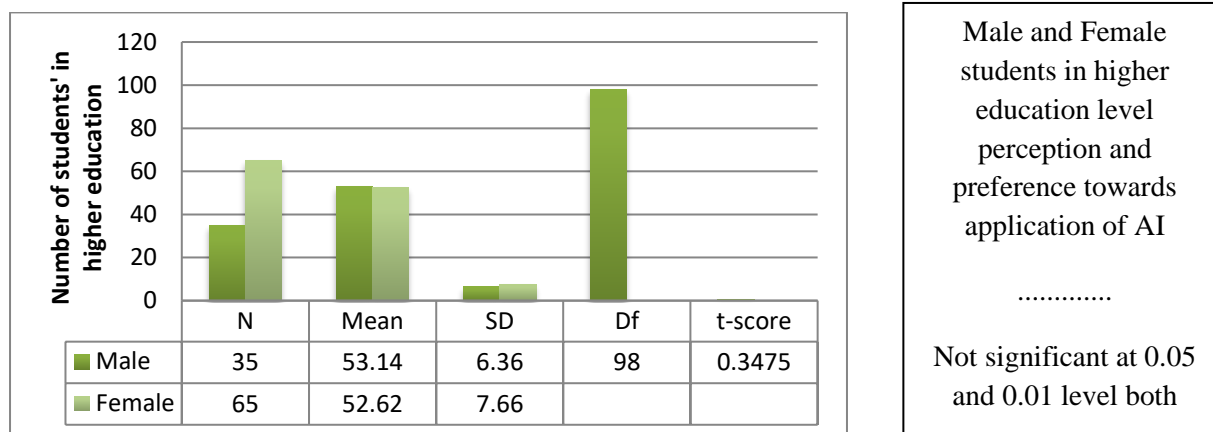
**H<sub>0</sub>:** There is no significant difference in perception and preference regarding the application of Artificial Intelligence among male and female higher education students.

**Table 4 The perception and preference of the male and female students to gender (Male/Female).**

Groups	N	Mean	Σ	Df	Calculated t-value	Critical t-value	Ns/N	Remarks
Male	33	53.14	6.36	98	0.3475	0.05 level=1.985	Ns at 0.05 level	Failed to reject or accepted
Female	67	52.62	7.66			0.01 level=2.627	Ns at 0.01 level	Failed to reject or accepted

## Students Perception and Preferences of the Application of Artificial Intelligence (AI) in Higher Education: A Metacognitive Exploration

A graph shows the mean difference between male and female students in higher education regarding the application of AI in higher education. (fig:2)



By conventional criteria, the difference is considered to be not statistically significant intermediate values used in calculations:  $t = 0.3475$ ,  $Df = 98$ , and Standard error of difference = 1.518

So, the researchers show that the calculated t-value is 0.3475, the critical table t-value is 0.05, and the significance level is 1.985. The calculated t-value is lower than the table value, so the null hypothesis is accepted. Now, we can say that there is no significant difference in the attitude of male and female higher-education students toward applying AI to their educational purposes.

The researchers also tested the hypothesis at a 0.01 significance level. The calculated t-value is 0.3475, and the critical table t-value is 2.627. The null hypothesis is accepted since the calculated t-value is lower than the table value. Now, we can say that there is no significant difference in the perception of students in higher education towards the application of AI in higher education.

### Section-2

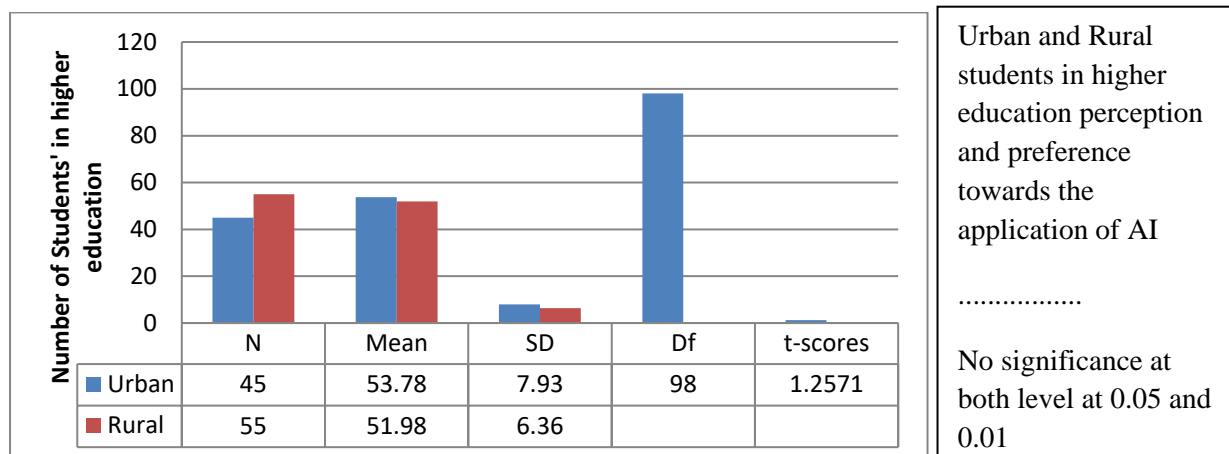
**H<sub>0</sub>: There is no significant difference in perception and preference of Artificial Intelligence's application among urban and rural higher education students.**

**Table: 5 The perception preference difference among higher education students concerning location (Urban/Rural)**

Groups	N	Mean	$\Sigma$	Df	Calculate t-value	Critical t-value	Ns/N	Remarks
Urban	45	53.78	7.93	98	1.2571	0.05 level=1.985	Ns at 0.05 level	Accepted or failed to Reject
Rural	55	51.98	6.36			0.01 level=2.627	Ns at 0.01 level	Accepted or failed to Reject

## Students Perception and Preferences of the Application of Artificial Intelligence (AI) in Higher Education: A Metacognitive Exploration

A graph shows the mean difference between urban and rural areas students in higher education regarding the application of AI in higher education (fig: 3)



By conventional criteria, this difference is considered to be not statistically significant intermediate values used in calculations:  $t=1.2571$ ,  $Df=98$ , and Standard error of difference =1.429

So, the researchers show that the calculated t-value is 1.2571, the critical table t- t-value is 0.05, and the significant level is 1.985. The calculated t-value is lower than the table value, so the null hypothesis is accepted; now, we can say that there is no significant difference in the attitude of urban and rural students at higher education levels towards the application of AI in their educational purposes.

The researchers also tested a 0.01 significant level; the calculated t-value is 1.2571, and the critical table value t-value is 2.627. The null hypothesis is accepted since the calculated t-value is lower than the table value. Now, we can say that there is no significant difference in the attitude of urban and rural students towards applying AI in higher education.

### Section: 3

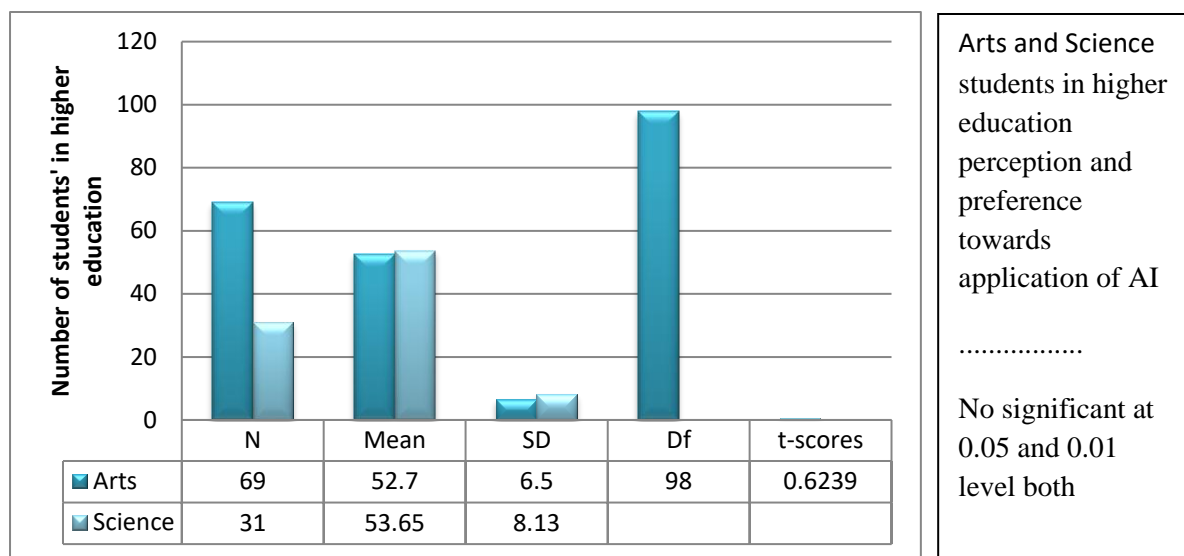
**H<sub>0</sub>: There is no significant difference in perception and preference for applying Artificial Intelligence among their higher education students for their streams.**

*Table 6 shows higher education students' perception and preference differences regarding their streams (Arts/Science).*

Group	N	Mean	$\Sigma$	Df	Calculated t-value	Critical t-value	Ns/N	Remarks
Arts	69	52.70	6.50	98	0.6239	0.05 level=1.985	Ns at 0.05 level	Accepted or Fail to Rejected
Science	31	53.65	8.13			0.01 level=2.627	0.01 level	Accepted or Fail to Rejected

The graph shows the mean difference between Arts and Science students in higher education regarding the application of AI in higher education (fig: 4)

## Students Perception and Preferences of the Application of Artificial Intelligence (AI) in Higher Education: A Metacognitive Exploration



Arts and Science students in higher education perception and preference towards application of AI  
.....  
No significant at 0.05 and 0.01 level both

By conventional criteria, this difference is considered to be not statistically significant intermediate values used in calculations:  $t=0.6239$ ,  $Df=98$ , and Standard error of difference =1.522.

So, the researchers show that the calculated t-value is 0.6239, the critical table t- t-value is 0.05, and the significant level is 1.985. The calculated t-value is lower than the table value, so the null hypothesis is accepted; now we can say that there is no significant difference in the attitude of Arts and Science students at the higher education level towards applying AI for their educational purposes.

The researchers also tested at a 0.01 significant level. The calculated t-value is 0.6239, and the critical table value is 2.627. The calculated t-value is lower than the table value, so the null hypothesis is accepted. Now, we can say that there is no significant difference in the attitude of Arts and Science students towards applying AI in higher education.

### DISCUSSION

In this section, the researchers have highlighted some important notions from the above analysis. These are:

Based on the findings of objective one, both male and female students have a positive attitude and favourable attitude toward the application of artificial intelligence, which means that every student, irrespective of their gender, wants to use AI in their education. Now a day’s commencement of technology in every sector is highly remarkable. Specifically, in the education sector, the use of ITC and AI is very common. At present, so many institutions have launched several initiatives on the application of AI in Microsoft Excel, and within a few seconds, users can solve several formulas. So, irrespective of gender, both can perform very well in education.

The findings from the second objective indicate that both rural and urban students have a positive attitude toward applying AI in education. So, it is clear that students in both localities think about the usability of AI in the education sector.

The result of the third objective reflected and indicate that no significant difference in attitude towards the application of AI in education among arts and science students. At present,

## Students Perception and Preferences of the Application of Artificial Intelligence (AI) in Higher Education: A Metacognitive Exploration

students with both arts and science backgrounds have a positive attitude toward using AI for their educational purposes. AI tools are proposed to be introduced in our curriculum and assessment systems, making the curriculum and assessment procedure more exciting and enjoyable.

### CONCLUSION

The applications of AI in education is a new footstep for the generation alpha. Nowadays, students use several AI tools like ChatGPT (generates dialogue created by open AI), Grammarly (reviews spelling, grammar, and punctuation, detects plagiarism, etc.), Tutor AI (connects students with qualified tutors), QuillBot (online writing platform), Duolingo (language learning application), Education Copilot (platform for lesson plans, writing prompts, students reports, and project outlines), Curipod ( interactive presentation tool for making lessons) etc. are the most famous AI tools in educational purposes. From the apparent discussion, we can say AI plays a significant role in empowering people and students with the knowledge and skills that lead to successful career opportunities. Based on this small-scale study in Purulia district higher education students, the researcher investigated the real attitude of the graduate, postgraduate, B.Ed students, and engineering students towards the application of AI in education, and the researcher investigated that irrespective of Gender (Male/ Female), Localities (Urban/ Rural), Streams (Arts/ Science). The researcher found the favorable attitude toward using AI in their day-to-day life and education is more commendable.

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### ***Conflict of Interest***

The author(s) declared no conflict of interest.

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