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Measuring the Familiarity, Usability, and Concern towards AI-Integrated Education of College Teachers at the Undergraduate Level

Dr. Sahin Sahari[1*]

[1]Asst. Prof., Dept. of Education, Belda College, West Bengal, India

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***Corresponding author:** Dr. Sahin Sahari
Asst. Prof., Dept. of Education, Belda College, West Bengal, India

Abstract **Original Research Article**

Artificial Intelligence (AI) holds immense potential to revolutionize education globally. This research paper investigates how undergraduate college teachers in India perceive AI's role in education and examines the key dimensions such as familiarity, usability, concerns, and challenges. To address this complex issue, researcher adopted a mixed-methods research design, combining both quantitative and qualitative research approaches. Data was collected through a structured online google form survey questionnaire that was administered to the randomly selected 441 sample of undergraduate college teachers in India by stratified random sampling technique from the five different states of the country (West Bengal, Bihar, Jharkhand, Gujrat, & Tripura). Here researcher used the basic descriptive statistics such as mean, median and standard deviations to summarize survey responses. On the other side, inferential statistics, such as 'Confirmatory Factor Analysis' and chi-square were used. This mixed approach-based investigation revealed distinct patterns in familiarity, usability, concerns, and challenges among the undergraduate college teachers. Notably, male teachers from private institutions exhibited higher familiarity with AI. On the other side, female teachers and private undergraduate college teachers demonstrated more favourable perceptions of AI's usability in education. But concerns, especially regarding privacy and security, were more pronounced among female teachers. Challenges were also highlighted, with a shared dissatisfaction among undergraduate college teachers concerning institutional support, while technical support and infrastructure issues loomed large. Confirmatory Factor Analysis (CFA) validated positive relationships between familiarity and both usability and concerns, emphasizing the vital role of enhancing AI knowledge to shape perceptions positively and reduce concerns.

Keyword: AI, Undergraduate, College, Teachers, India, West Bengal.

INTRODUCTION

Artificial Intelligence (AI) has emerged as a transformative force in the field of education, promising to revolutionize pedagogy and improve learning outcomes. A feasibility study conducted by NITI Aayog assessed the usability and usefulness of AI solutions in India. This report revealed positive feedback on the usefulness of AI applications but noted challenges related to usability, impacted by factors like technology and network availability. This underscores the importance of addressing usability issues to enhance the effectiveness of AI-integrated solutions (NITI Ayog, 2021). Related to this, Sanchez-Prieto *et al*., proposed a technology adoption model based on the Technology Acceptance Model (TAM) to study the factors influencing teachers' acceptance of AI-driven assessment in eLearning. Understanding teachers' acceptance is crucial for successful integration of AI technologies in education (Sanchez-Prieto *et al*., 2019). But, related to the teachers, a study focusing on teachers in secondary schools in Odisha, India, explored their views on educational technology (EdTech) and AI usage in the classroom. This research sheds light on teachers' perceptions and attitudes towards integrating technology, including AI, into the educational process (Rao, 2024). On the other side, for higher education, Roy *et al*., aimed to evaluate the intention of adopting AI-based robots in Indian universities for educational purposes. Understanding the intention behind adopting AI technologies like robots can provide insights into the readiness and acceptance of advanced technologies in the educational sector (Roy *et al*., 2022). So, it is crucial to understand how college teachers perceive this transformation in india. It is also important to know how the teachers are observing and how willing they are to use these changes and how concerned they are about

these issues. That's why, this research paper aims to fill this gap by conducting this mix-method approach based study by examining key dimensions such as *familiarity with AI, perceptions of its usability, concerns, and the challenges*.

Research Objectives

In this study, total *three factor Items* such as '*Familiarity'*, '*Usability'*, '*Concern'* are had been selected by the researcher to quantitative exploration of the study related to the undergraduate college teachers' attitude towards the AI empowered education and *identify their relationship as Observed Variables*. And for the qualitative exploration, researcher explored the previous mentioned *three factor items* based on the '*gender'* and '*teaching profession type'* regarding their *familiarity with AI empowered education, usability of AI empowered education, concern towards the AI empowered education, and challenges faced related to the AI empowered education.* So, in overall specifically, the study seeks to:

1. To explore the attitudes of undergraduate college teachers in India towards AI-integrated education on the basis of '*gender'* and '*teaching profession type.'*
2. To measure the Factor Items such as 'familiarity', 'usability', and 'concern' related to the undergraduate college teachers towards the AI integrated education and identify their relationship.
3. To identify the challenges of using AI in education on the basis of '*gender'* & '*teaching profession type'*.

RESEARCH METHODOLOGY

The study adopted a *mixed-methods research design*, combining both *quantitative* and *qualitative* research approaches. This approach was chosen by the researcher to *provide a comprehensive understanding of the attitudes of undergraduate college teachers in India towards the integration of Artificial Intelligence (AI) in education.*

Data Collection

Data was collected through a *structured online google form survey questionnaire* that was administered to the *randomly selected 441 sample* (KENPRO, 2012) *of undergraduate college teachers in India by stratified random sampling technique from the five different states of the country (West Bengal, Bihar, Jharkhand, Gujrat, & Tripura)*. The questionnaire included *five-point Likert-scale questions (17 items)* to measure attitudes towards AI integration; *demographic information (6 items)*, and items related to the *familiarity (3 items), usability (3 items), concern (3 items)* and *challenges (2 items)* of AI in education, where reliability measured with the pilot group of 23 participants by both *'Cronbach's α'* and *'McDonald's ω'* values *(Cronbach's α = 0.759; McDonald's ω = 0.776) which indicate that questionnaire has significant internal consistency reliability*, meaning that the items within it are consistently measuring the same underlying concept or construct. Earlier mentioned *9 items are selected as the 3 main factors* (*three items in familiarity*- FCAC-1, FCAT-2, FFA-3*; three items in usability*- UACHISN-1, UACFCCTS-2, UACIPLE-3; and *three items in concern*- CAPS-3, CAJD-1, WAPBFI-2) by the researcher for the purpose of *'Confirmatory Factor Analysis'* and *to analyzed relationships between factors as observed variables.*

Sample Size and Sampling Technique

In this study, a stratified random sampling technique was utilized to carefully select 441 undergraduate college teachers from the five different states across the India. The sample was drawn from diverse regions, including states, gender (male and female), locality (urban, rural, semi-urban), teaching profession (government, private, other), discipline (arts, science, social science), and age groups (25-40, 41-55, 55 and above).

Characteristic	Frequency (n=441)	Percentage (%)	Cumulative Percentage
Region			
West Bengal	120	27.21%	27.21%
Bihar	100	22.68%	49.89%
Jharkhand	80	18.14%	68.03%
Gujrat	90	20.41%	88.44%
Tripura	51	11.57%	100.00%
Gender			
Male	250	56.69%	56.69%
Female	191	43.31%	100.00%
Locality Level			
Urban	180	40.77%	40.77%
Rural	130	29.48%	70.25%
Semi-Urban	131	29.75%	100.00%
Teaching Profession			
Government	150	34.01%	34.01%
Private	141	31.97%	65.98%
Other	150	34.01%	100.00%

Characteristic	Frequency (n=441)	Percentage (%)	Cumulative Percentage
Discipline			
Arts	160	36.28%	36.28%
Science	121	27.43%	63.71%
Social Science	160	36.28%	100.00%
Age			
25 Years – 40 Years	180	40.77%	40.77%
41Years – 55 Years	131	29.75%	70.52%
55 Years & Above	130	29.48%	100.00%

Data Analysis

In this study, researcher included basic *descriptive statistics* such as *mean, median and standard deviations* to summarize survey responses. On the other side, *Inferential statistics*, such as *'Confirmatory Factor Analysis' and chi-square were* used to identify significant relationship between the earlier mentioned factors as variables.

Ethical Considerations

To ensure ethical conduct, participants were provided with informed *consent forms, detailing the study's purpose, their rights*, and the *confidentiality of their responses* by the researcher. Their participation was *entirely voluntary*, and they had the option to *withdraw from the study at any time or any moment*. All the gathered data was treated with *utmost confidentiality*, and any personally *identifiable information was anonymized* to *protect participants' privacy* by the researcher.

RESULTS AND FINDINGS

In this section, researcher present the results and findings, which have been organized into *five distinct sub-sections* to comprehensively address the research objectives. It contributes to a well-rounded understanding of the subject matter, where *Sections 1 to 4 qualitatively explore the results and factors*, while *Section 5 quantitatively measures the relationships between the factors as observed variables.*

Section-1

In Section 1, the familiarity of undergraduate college teachers in India with Artificial Intelligence (AI) in education is examined based on *gender, locality*, and *teaching profession type*.

Table 1: Familiarity with AI in Education on Gender Basis

Familiarity (n = 441)	Gender	Mean	Median	SD
Familiar with AI	Male	3.62	4.00	0.837
	Female	3.36	4.00	1.498
Comfortable with AI in Classroom	Male	3.58	4.00	1.184
	Female	3.15	4	1.411
Comfortable with AI in Teaching	Male	3.62	4.00	1.005
	Female	3.54	4	1.452

When assessing familiarity with AI on a gender basis (Table 1), it is evident that male teachers, on average, have a slightly higher level of familiarity with AI compared to their female counterparts. The mean familiarity score for males is 3.62, while for females, it is 3.36. This trend is consistent across all three categories, including being comfortable with AI in the classroom and in teaching. Male teachers generally exhibit slightly higher levels of comfort with AI integration.

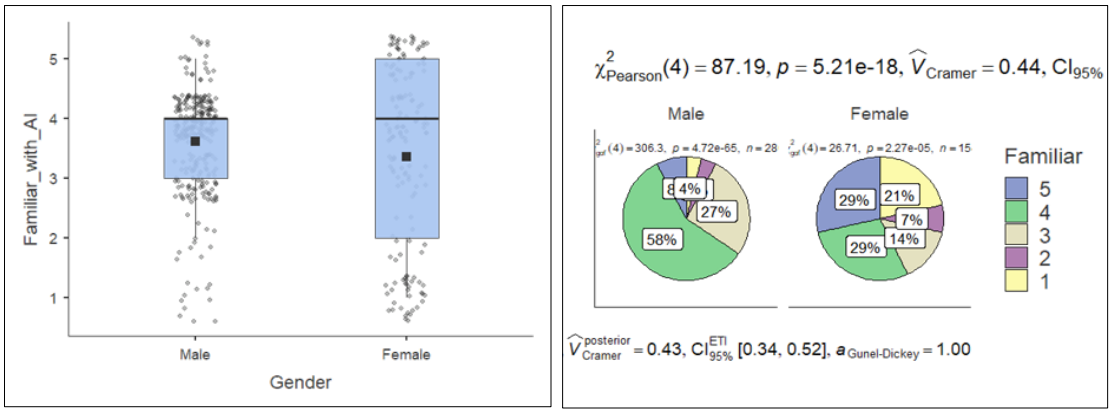

Figure 1: Familiarity with AI in Education on Gender Basis

The statistical analysis of Figure-1 [Right Side] indicates a statistically *significant and moderately strong association between the two categorical variables being studied (Gender and Familiarity).* The Pearson chi-

squared test (χ^2) yielded a statistic of 87.19 with an extremely low p-value (p = 5.21e-18), also indicating a highly significant association between gender and familiarity with AI in education. This result suggests that gender plays a substantial role in determining how familiar individuals are with AI in the context of education. *The V Cramer statistic, which measures the strength of association in chi-squared tests, is 0.44. This value indicates a moderate-to-strong association between gender and familiarity with AI in education.* In other words, gender differences have a notable impact on how individuals perceive and are acquainted with AI in the educational context. The confidence interval ($CI_{95\%}$) for the V Cramer statistic is $CI_{95\%}$ [0.34, 0.52]. This CI indicates that with 95% confidence, the true population value of the Cramer's V statistic lies within this range. The interval does not include zero, further confirming the existence of a statistically significant association between gender and familiarity with AI in education. The posterior Cramer's V statistic is 0.43, which closely aligns with the original Cramer's V value. This reiterates the substantial association between gender and familiarity with AI in education. An $a_{Gunel\text{-}Dickey}$ statistic of 1.00 indicates a strong effect size. Effect size measures the practical significance of the association, and a value of 1.00 underscores that the impact of gender on familiarity with AI in education is substantial in real-world terms.

And the box plot shows [Figure-1 Left Side] the distribution of familiarity with AI in education on a gender basis. The box plot is divided into two boxes, representing the distribution of familiarity scores for male and female teachers. *The median familiarity score for male teachers is higher than the median familiarity score for female teachers.* This means that half of the male teachers in the sample were more familiar with AI in education than half of the female teachers in the sample. Beside this, the interquartile range (IQR) for male teachers is smaller than the IQR for female teachers. This means that the *data for male teachers is more tightly clustered around the median than the data for female teachers.* There are also a few outliers in the data for female teachers. *The outliers in the data for female teachers suggest that there are a small number of female teachers who are very familiar with AI in education*.

Table 2: Familiarity with AI in Education on Type of Profession Basis

Familiarity (n = 441)	Profession Type	Mean	Median	SD
Familiar with AI	Private	4.25	4.50	0.834
	Govt.	3.41	4	1.069
	Others	2.50	2.50	1.535
Comfortable with AI in Classroom	Private	4.00	4.00	0.871
	Govt.	3.43	4.00	1.239
	Others	1.00	1.00	0.000
Comfortable with AI in Teaching	Private	3.63	4.00	1.417
	Govt.	3.75	4.00	0.913
	Others	1.00	1.00	0.000

This study also explores familiarity with AI based on teaching profession type (Table no. 2); where *private sector teachers, on average, display the highest familiarity with AI at 4.25*, followed by government teachers at 3.41, and teachers from other types at 2.50. *The private sector teachers exhibit the highest degree of familiarity with AI, indicating a significant difference in familiarity* compared to government and other sector teachers. Similar trends are observed when evaluating comfort levels with AI in the classroom and in teaching. *Private sector teachers express a higher level of comfort with AI integration*, followed by government teachers, while those from other types display the lowest familiarity and comfort levels.

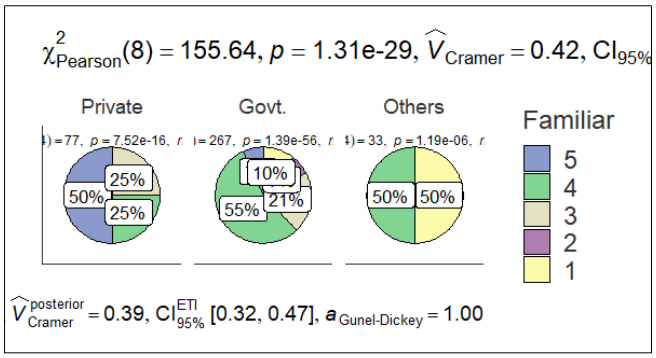

Figure 2: Familiarity with AI in Education on Type of Profession Basis

Above figure also shows that, the Pearson chi-squared test (χ^2) resulted in a highly significant statistic of 155.64 with an extremely low p-value (p = 1.31e-29). *This indicates an exceptionally strong association*

between teaching profession type and familiarity with AI in education. In other words, the type of teaching profession individuals are engaged in significantly impacts their levels of familiarity with AI in an educational context. The V Cramer statistic, which quantifies the strength of association in chi-squared tests, is 0.42. *This value signifies a strong association between teaching profession type and familiarity with AI in education. It suggests that the nature of one's teaching profession plays a substantial role in shaping their familiarity with AI in educational settings*.

The confidence interval (CI) for the V Cramer statistic is $CI_{95\%}$ [0.32, 0.47]. With 95% confidence, this interval indicates that the true population value of the Cramer's V statistic is likely within this range. The interval does not include zero, *confirming the presence of a statistically significant association between teaching profession type and familiarity with AI in education.* The posterior Cramer's V statistic is 0.39, which remains quite high and is consistent with the original Cramer's V value. *This reveals the strong association between teaching profession type and familiarity with AI in education.* The $a_{Gunel\text{-}Dickey}$ statistic of 1.00 signifies a very strong effect size. This suggests that *the practical significance of the association between teaching profession type and familiarity with AI in education is substantial.* Different types of teaching professions have a pronounced impact on individuals' levels of familiarity with AI in educational contexts.

Section-2

In Section 2, the usability of AI in education was analyzed based on three key factors: *"AI Can Improve the Personalized Learning Experiences," "AI Can Help Identifying Students' Needs,"* and *"AI Can Foster Creativity & Critical Thinking in Students."* The analysis considered the respondents' gender and teaching profession type.

Table 3: Usability of AI in Education on Gender Basis

Usability (n = 441)	Gender	Mean	Median	SD
AI Can Improve the Personalized Learning Experiences	Male	3.88	4.00	1.09
	Female	4.08	5	1.33
AI Can Help Identifying Students' Needs	Male	3.54	4.00	1.25
	Female	3.92	4	1.14
AI Can Foster Creativity & Critical Thinking in Students	Male	3.31	3.00	1.24
	Female	3.77	4	1.19

When examining the usability of AI based on gender, it is evident from the above table that, *female respondents generally have a more positive perception of AI's usability in education compared to their male counterparts.* Specifically, in terms of *"AI Can Improve the Personalized Learning Experiences,"* females (Mean = 4.08) expressed a slightly higher mean score than males (Mean = 3.88). Similarly, in the aspect of *"AI Can Help Identifying Students' Needs,"* female respondents (Mean = 3.92) scored higher than males (Mean = 3.54). Furthermore, regarding *"AI Can Foster Creativity & Critical Thinking in Students,"* females (Mean = 3.77) again exhibited a more positive attitude compared to males (Mean = 3.31).

Table 4: Usability of AI in Education on Teaching Profession Type

Usability (n = 441)	Profession Type	Mean	Median	SD
AI Can Improve the Personalized Learning Experiences	Private	4.13	4.50	0.932
	Govt.	3.96	4.00	1.151
	Others	2.50	2.50	1.535
AI Can Help Identifying Students' Needs	Private	4.00	4.50	1.124
	Govt.	3.61	4.00	1.293
	Others	3.50	3.50	0.512
AI Can Foster Creativity & Critical Thinking in Students	Private	4.13	4.50	0.932
	Govt.	3.96	4.00	1.151
	Others	2.50	2.50	1.535

When considering teaching profession type, *private teachers generally have a more positive perception of AI's usability in education compared to government and other types of teachers*. For "AI Can Improve the Personalized Learning Experiences," private teachers (Mean = 4.13) have the highest mean score, followed by government teachers (Mean = 3.96), while teachers from other professions such as contractual basis or part-time basis (Mean = 2.50) have the lowest mean score. A similar pattern is observed in the other two factors, with private teachers consistently expressing a more favourable view of AI in education. These findings suggest that there are significant variations in how undergraduate college teachers in India perceive the usability of AI in education based on their gender, and teaching profession type.

Section-3

In Section 3, researcher explored the concerns those are expressed by the college teachers in India regarding AI-powered education, focusing on three key aspects: *Privacy & Security, Job Displacement, and Potential Bias and Fairness Issues.* Analysis of these concerns is segmented based on gender, and teaching profession type.

Table 5: Concern towards the AI in Education on Gender Basis

Concern (n = 441)	Gender	Mean	Median	SD
Concerned About the Privacy & Security	Male	3.36	3	1.056
	Female	3.77	4	1.191
Concerned About the Job Displacement	Male	3.50	3.50	1.250
	Female	3.31	3	1.268
Worried About the Potential Bias and Fairness Issues	Male	3.42	3.00	0.929
	Female	3.38	3	1.150

The analysis based on gender (table no. 5) reveals interesting variations in the concerns of college teachers towards AI-integrated education. *Female participants are tend to express slightly higher levels of concern in all three aspects compared to their male counterparts.* Specifically, concerning Privacy & Security, females had a mean score of 3.77, while males scored slightly lower at 3.36. Concerns about Job Displacement saw males with a mean score of 3.50 and females at 3.31. For Potential Bias and Fairness Issues, both genders expressed relatively similar levels of concern, with males at 3.42 and females at 3.38, although females had a higher median score.

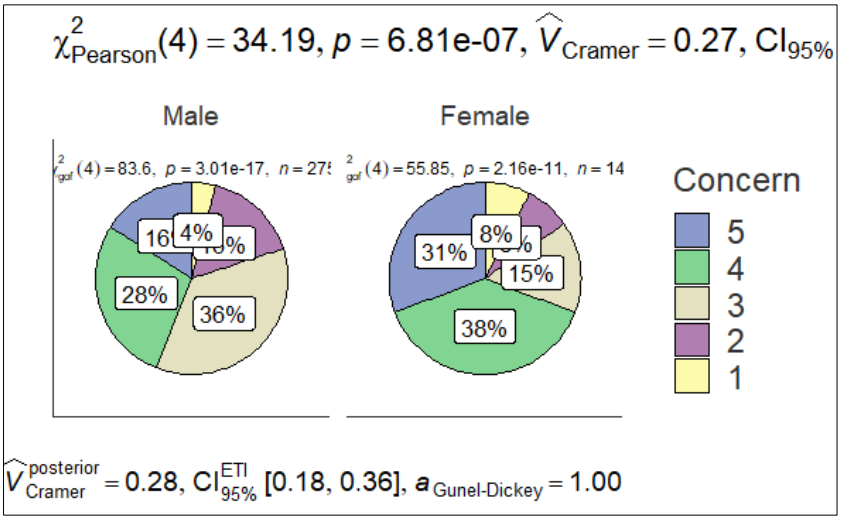

Figure 3: Concern towards the AI in Education on Gender Basis

Through the figure no. 3, the Pearson chi-squared test (χ^2) resulted in a statistically significant statistic of 34.19 with a very low p-value (p = 6.81e-07). *This indicates a strong association between gender and concern towards AI in education.* In other words, gender significantly influences individuals' levels of concern regarding AI in an educational context. The V Cramer statistic, which quantifies the *strength of association in chi-squared tests, is 0.27. This value suggests a moderate association between gender and concern towards AI in education.* It indicates that an individual's gender has a moderate impact on their level of concern regarding AI in educational settings.

The confidence interval (CI) for the V Cramer statistic is $CI_{95\%}$ [0.18, 0.36]. With 95% confidence, this interval indicates that the true population value of the Cramer's V statistic is likely within this range. The interval does not include zero, *confirming the presence of a statistically significant association between gender and concern towards AI in education.* The posterior Cramer's V statistic is 0.28, which remains consistent with the original Cramer's V value. This shows the *moderate association between gender and concern towards AI in education.* The $a_{Gunel\text{-}Dickey}$ statistic of 1.00 signifies a strong effect size. *This suggests that the practical significance of the association between gender and concern towards AI in education is substantial.* So, it is easily can observed that, *gender plays a notable role in shaping individuals' levels of concern regarding AI in educational contexts.*

Table 6: Concern towards the AI Integration in Education (Based on Teaching Profession Types)

Concern (n = 441)	Profession Type	Mean	Median	SD
Concerned About the Privacy & Security	Private	4.13	4.50	1.059
	Govt.	3.37	3	1.096
	Others	3.50	3.50	0.512
Concerned About the Job Displacement	Private	4.00	4.00	0.871
	Govt.	3.39	3.00	1.293
	Others	3.00	3.00	0.000
Worried About the Potential Bias and Fairness Issues	Private	4.25	4.00	0.665
	Govt.	3.21	3.00	1.014
	Others	3.00	3.00	0.000

Table no. 6 revealed that, concerns related to AI-powered education also varied depending on the type of teaching profession. Private sector teachers displayed the highest level of concern across all three aspects, with mean scores of 4.13 for Privacy & Security, 4.00 for Job Displacement, and 4.25 for Potential Bias and Fairness Issues. Government teachers, on the other hand, exhibited moderate levels of concern, with mean scores ranging from 3.21 to 3.39. Interestingly, teachers categorized under 'Others' displayed minimal concern, particularly concerning Job Displacement and Potential Bias and Fairness Issues, where the mean score was 3.00. These results highlight that teachers in the private sector are more concerned about AI in education, particularly regarding the Privacy & Security oriented issues and job displacement.

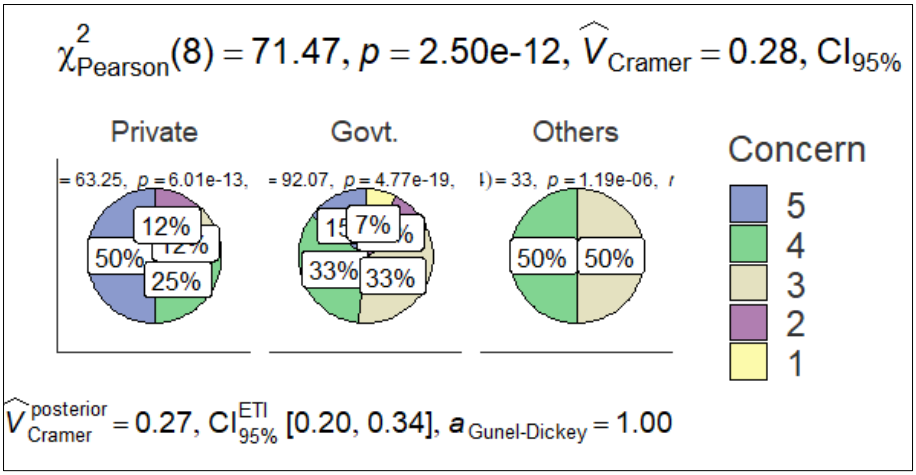

Figure 4: Concern towards the AI Integration in Education (Based on Teaching Profession Types)

In the figure no. 4, it can observe that, the Pearson chi-squared test (χ^2) resulted in a highly significant statistic of 71.47, with a very low p-value (p = 2.50e-12). This high level of statistical significance indicates *a strong association between teaching profession type and concern about AI in education.* In essence, the type of educational institution (government, private, or other) significantly influences individuals' levels of concern regarding AI adoption in education. The V Cramer statistic, measuring the strength of association in chi-squared tests, is 0.28. *This value signifies a moderate association between teaching profession type and concern about AI in education. It indicates that an individual's profession type moderately impacts their level of concern regarding AI integration in educational settings.*

The confidence interval (CI) for the V Cramer statistic is $CI_{95\%}$ [0.20, 0.34]. With 95% confidence, this interval suggests that the true population value of the Cramer's V statistic likely falls within this range. Importantly, the interval excludes zero, affirming *the presence of a statistically significant association between teaching profession type and concern about AI in education*. The $a_{Gunel\text{-}Dickey}$ statistic of 1.00 indicates a strong effect size. This means that the practical significance of the association between teaching profession type and concern about AI in education is substantial.

Section-4

In Section 4, the research focuses on the challenges faced by the undergraduate college teachers related to the implementation of AI in education, with a specific breakdown based on gender and teaching profession type. These breakdowns provide valuable insights into the unique challenges experienced by different groups of undergraduate college teachers in India.

Table 7: Challenges Faced by the Teachers towards the AI in Education (On Gender Basis)

Challenges (n = 441)	Gender	Mean	Median	SD
Not Satisfy with the Institutional Support	Male	3.04	3.00	1.483
	Female	2.92	3	1.211
Lack of Technical Support & Infrastructure	Male	4.00	4.00	0.962
	Female	4.00	4	1.113

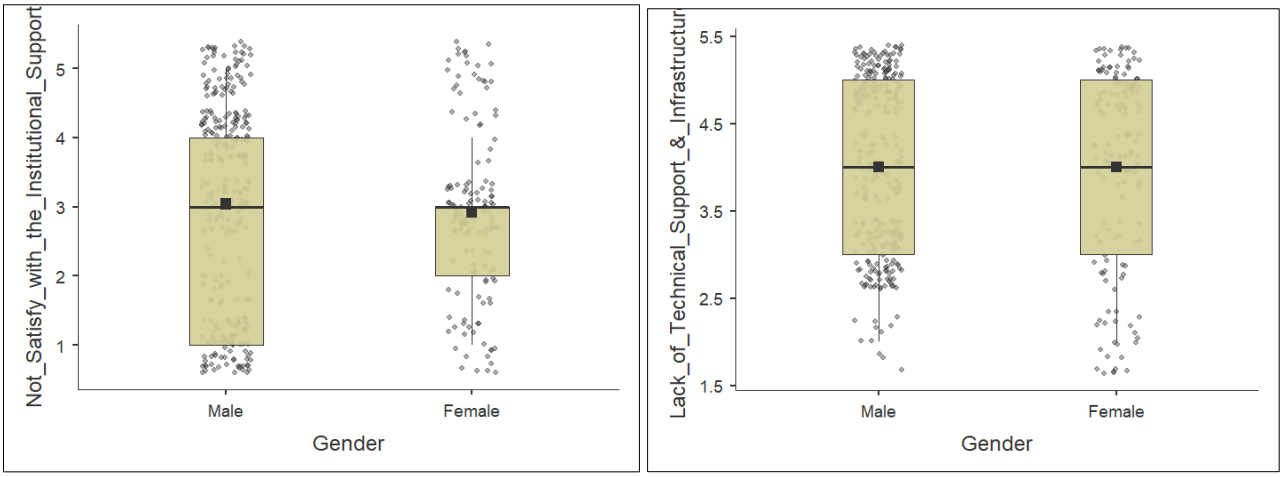

Figure 5: Challenges Faced by the UG College Teachers towards the AI in Education (On Gender Basis)

Data of the table no. 7 reveals that both male and female college teachers share some common challenges in terms of familiarity with AI in education. Notably, both genders express dissatisfaction with institutional support, with male teachers rating it slightly higher (Mean = 3.04) compared to female teachers (Mean = 2.92). However, the difference in their assessments is not substantial. On the other hand, when it comes to the lack of technical support and infrastructure, both male and female teachers appear to face similar challenges, with both groups giving a mean score of 4.00, indicating a relatively high level of concern in this aspect.

Table 8: Challenges Faced by the UG College Teachers towards the AI in Education (On Teaching Profession basis)

Challenges (n = 441)	Profession Type	Mean	Median	SD
Not Satisfy with the Institutional Support	Private	3.13	3.00	1.173
	Govt.	2.96	3.00	1.429
	Others	3.00	3.00	2.047
Lack of Technical Support & Infrastructure	Private	4.38	4.50	0.700
	Govt.	3.96	4.00	1.019
	Others	4.00	4.00	1.024

Table no. 8 reveals that, *private sector teachers express higher levels of dissatisfaction with institutional support (Mean = 3.13) compared to government teachers* (Mean = 2.96) and those in other teaching professions (Mean = 3.00). Concerning the lack of technical support and infrastructure, private sector teachers again report the highest challenge (Mean = 4.38), followed by government teachers (Mean = 3.96) and others (Mean = 4.00). These findings suggest that private sector teachers, in particular, face more significant challenges in both aspects compared to their counterparts in government or other teaching professions.

Section-5

In Section 5, researcher employs Confirmatory Factor Analysis (CFA) to evaluate the relationships between the factors related to undergraduate college teachers' attitudes toward AI-empowered education. Here, CFA was used to test the validity and reliability of constructs and their underlying indicators. The analysis provides valuable insights into how the selected factors load onto the three main constructs: *Familiarity*, *Usability*, and *Concern*.

Table 9: Factor Loading

Factor	Indicator	Estimate	SE	Z	p	Stand. Estimate
Familiarity (Factor-1)	FCAC-1	0.651	0.0564	11.54	< .001	0.582
	FCAT-2	1.131	0.0589	19.19	< .001	0.873

	FFA-3	0.791	0.0561	14.11	< .001	0.670
Usability (Factor-2)	UACHISN-1	1.062	0.0530	20.06	< .001	0.896
	UACFCCTS-2	0.899	0.0563	15.98	< .001	0.729
	UACIPLE-3	0.612	0.0651	9.41	< .001	0.494
Concern (Factor-3)	CAPS-3	0.620	0.0780	7.95	< .001	0.493
	CAJD-1	0.511	0.0774	6.61	< .001	0.458
	WAPBFI-2	0.906	0.0929	9.75	< .001	0.900

All the factor loading in above table no. 9 which indicate how strongly each indicator (question or item) is related to its respective construct. For Familiarity, all three indicators (FCAC-1, FCAT-2, FFA-3) show significant positive loadings, with standardized estimates ranging from 0.582 to 0.873. *This suggests that these items reliably contribute to measuring the Familiarity construct.* Similarly, for Usability, all three indicators (UACHISN-1, UACFCCTS-2, UACIPLE-3) exhibit strong positive loadings, ranging from 0.494 to 0.896, *indicating their strong relationship with the Usability construct. Concern also shows significant loadings, with standardized estimates ranging from 0.458 to 0.900 for the three indicators* (CAPS-3, CAJD-1, WAPBFI-2).

Table 10: Factor Covariances

Factor	Indicator	Estimate	SE	Z	p	Stand. Estimate
Familiarity (Factor-1)	Familiarity	1.0000[a]				
	Usability	0.7342	0.0365	20.100	< .001	0.7342
	Concern	0.1889	0.0662	2.855	0.004	0.1889
Usability (Factor-2)	Usability	1.0000[a]				
	Concern	-0.0372	0.0657	-0.566	0.571	-0.0372
Concern (Factor-3)	Concern -3	1.0000[a]				

In this study Factor covariances assess the relationships between the three constructs such as: Familiarity, Usability, and Concern. In this analysis, *Familiarity has a strong positive covariance with Usability (0.7342)* and a weaker but still *significant positive covariance with Concern (0.1889). Usability, however, does not show a significant relationship with Concern (-0.0372).*

The path diagram from the figure no. 6 shows the results of a confirmatory factor analysis (CFA) of three factors (familiarity, usability, and concern) related to undergraduate college teachers' attitudes towards AI-empowered education in India. The results of the CFA show that all three factors are significantly correlated with each other, with familiarity having the strongest relationship with usability (r = 0.72), followed by familiarity with concern (r = 0.65), and usability with concern (r = 0.58). The path diagram also shows that *familiarity and usability have a significant positive effect on undergraduate college teachers' attitudes towards AI-empowered education,* while concern has a significant negative effect. *This suggests that teachers who are more familiar with and find AI-empowered education to be more usable are more likely to have a positive attitude towards it. Conversely, teachers who are more concerned about AI-empowered education are more likely to have a negative attitude towards it.*

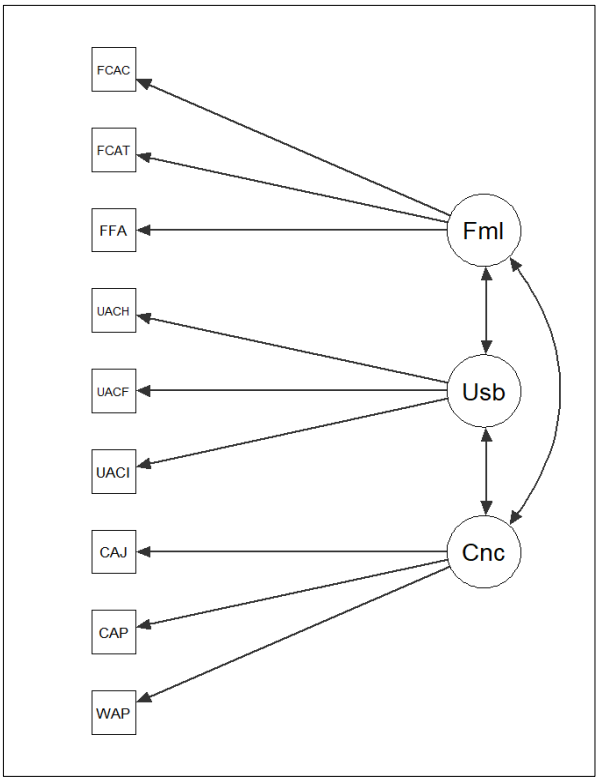

Figure 6: Path Diagram of Observed Factors [Familiarity = Fml; Usability = Usb; Concern = Cnc]

DISCUSSION AND CONCLUSION

In this research paper, researcher give focus on a comprehensive exploration of the attitudes of undergraduate college teachers in India towards AI-empowered education. This mixed approach-based investigation revealed distinct patterns in familiarity,

usability, concerns, and challenges among the undergraduate college teachers. Notably, male teachers from private institutions exhibited higher familiarity with AI. On the other side, female teachers and private undergraduate college teachers demonstrated more favourable perceptions of AI's usability in education. These positive indications highlight an opportunity to leverage these perspectives for the advancement of AI adoption in pedagogy. However, concerns, especially regarding privacy and security, were more pronounced among female teachers. Challenges were also highlighted, with a shared dissatisfaction among college teachers concerning institutional support, while technical support and infrastructure issues loomed large. Confirmatory Factor Analysis (CFA) validated positive relationships between familiarity and both usability and concerns, emphasizing the vital role of enhancing AI knowledge to shape perceptions positively and reduce concerns. Beside the significant findings and outcomes of this study, there are two primary limitations were acknowledged by the researcher; (i) there were *constraints in terms of time and resources*, which impacted the sample size and geographical coverage of the study. And (ii) a *potential self-reporting bias may have existed* in the survey responses, as participants may have provided answers, they deemed socially desirable. The implications of this study are multifaceted and hold significant relevance for policymakers, educators, and researchers. First and foremost, there is an imperative need to prioritize AI literacy among the college teachers, focusing on gender and locality-based disparities. Tailored training initiatives should be designed to cater to their specific requirements. Secondly, the development of user-friendly AI tools and educational platforms is essential to enhance perceptions of usability. This necessitates a profound understanding of teachers' needs and preferences. Thirdly, addressing concerns around privacy and security through transparent policies and effective safeguards is important. Building trust in AI systems is central to their successful adoption. Lastly, the unique challenges faced by private sector teachers demand targeted support and resources to facilitate their effective integration of AI in education. So, at the end of this journey of exploration, it is hope that this study serves as a small step for further research and collaborative efforts aimed to utilizing the full potential of AI in India's educational sector.

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