

Educator Readiness on AI Adoption in Rural Sambalpur: An Investigation using UTAUT

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Abstract:

This paper is an attempt to understand how Artificial Intelligence applications like Chat-GPT, Quillbot, Deepseek and others have got into the teaching lives of educators of Sambalpur, Odisha. The study utilizes Unified Theory of Acceptance and Use of Technology model to identify and assess the AI-acceptance process of the educators of Sambalpur district. Using a stratified random sampling the data was collected from each block of the district ensuring equal representation and increasing probability of generalization of the results. The focus of the study is on different factors namely; their operating environment, conditions and training facilities available to them and their surroundings including their colleagues which affect the perception and intention to use these trending AI-tools in their educational activities and it was revealed that AI integration in their educational activities is influenced by Challenges and Support Needs, Pedagogical Integration and Concerns, Interest and Resistance to AI Training, Technological Readiness and Familiarity, Institutional Support and Concerns and Resistance to Traditional Subjects and Innovations. It also revealed that behavioural intention to use these AI-tools need not necessarily lead to actual use of these tools and other external factors also affect the usage.

Keywords: Artificial Intelligence, Rural Education, Educator Readiness, Unified Theory of Acceptance and Use of Technology

Introduction

The 21st century is the era of technologies, starting from the computer revolution, cell phones, data revolution and now the genesis of Artificial intelligence. Artificial Intelligence has got into the lives of citizens with the presence of network and smart phones. Educational Institutions have not been spared from the presence of these AI-tools and it has got into the day-to-day activities of these educational systems and hence it is crucial to study the interactions between AI and education in different settings (Pedro F et al. 2019). In the times when AI is at birth-stage and yet is the most sensational theme of discussion, it is important to thoroughly understand its significance and threats associated with it in order to efficiently integrate it in our existing system for better delivery of services. Artificial Intelligence, if used properly, stores transformative powers to revolutionize education industry (Gruetzemacher & Whittlestone, 2022). One of the major reasons of this apprehended transformation is Subjective Learning. Artificial Intelligence can cater to subjective learning methods by personalizing

learning process, which is a short-coming for real-life educators. This can drastically change how people learn, restructuring the definition of education system (Maghsudi et al., 2021; Kokku et al., 2018).

Education is one of the most important pillars of a successfully governed Nation. Good education leads to sound governance facilitating a harmonious and prosperous Nation. Hence it will not be extravagance to say that effective governance system can be achieved through a flexible, yet strong education system (Amanchukwu, 2011). And in 2024, effective governance implies governance lead by ICT facilities and we can deduce that ICT-enabled governance system leads to improved and effective governance or e-governance. And there is a significant relationship among IT-enabled governance and quality of education (Bianchi & Sousa, 2016) and it is crucial for the nations to adapt these educational advancements to strengthen its governance system, especially for those nations which are either in developing or underdeveloped states.

Education is not merely a right, for say, rather it is a basic necessity for mankind. But, there is a significant disparity which creeps beneath the surface of so called global village, in form of education. There is a difference among countries, states, cities in education quality. However, the significant education divide that exists is between the rural and urban population and it significantly affects the nations' ability to adapt to the dynamic environment (Chuan-You, 2006). In India, there lies a remarkable disparity between rural and urban population (Agrawal, 2014). It de-shapes the demographic dividend and equality among citizens, as education serves as the basis of Government policies and expenditure, shaping its future. Odisha, as one of the oldest and not-so-developed state of India, has not escaped from this disparity, which is one of the motivations behind the study (Das et al., 2012). When we consider technology in education, there is a cost associated with it. The access to technology is by virtue of the ability to pay, and as India moving towards a capitalist economy, the variance in paying abilities among its citizens is quite high (Mertens et al., 2022). Thus, there is a significantly uneven distribution of technology among citizens, which also holds true for the education sector and its constituents, students and teachers alike (Bhattacharya & Kulshreshtha, 2022). This is another motivation behind the study; to understand the reach and access to AI-ICT facilities among teachers in rural areas of India.

Digital divide and uneven access to ICT technologies in Odisha is prominent (Agarwal & Panda, 2018) and this allows us to study the gap between urban and rural educators in Odisha, with respect to access to AI enabled ICT facilities and difference in perceived value of the technologies. Few of the challenges can be jotted down as:

Challenge	Description
<i>Access to Tools</i>	Limited availability of modern educational tools and resources.
<i>Skilled Educators</i>	A scarcity of educators adept in modern teaching methodologies.

<i>Instructional Materials</i>	Predominance of outdated instructional materials.
<i>Digital Divide</i>	A significant gap in technology adoption compared to urban areas.

These challenges are significant and must be addressed in order to understand, analyze and prepare the educators for the oblivious future surrounded by Artificial Intelligence.

Literature Review

Artificial Intelligence has changed the landscape of education since its inception. The most important and revolutionized aspect of the AI-integrated education is its ability to offer subjective learning with the ability to adapt to individual pace and needs of learners (Srinivasa et al., 2022). This attribute of the AI-enabled education system also allows instantaneous and personalized feedback enabling real-time assessment of the students. This facility can save time and reduce the time engagement by the students as well as teachers in content delivery as well as assessment (Grivokostopoulou et al., 2016). Along with providing real time and subjective assessment, this AI-enabled system can assess the learner's weak areas and provide support to improve these areas (Khan et al., 2021). This allows the learners to grow at their convenient speed offering specific solutions to their needs increasing satisfaction with learning (Holstein et al., 2019). Apparently, this beautiful technology comes with few disadvantages which are threatening in nature. One of those threats is in the shape of data privacy and data security.

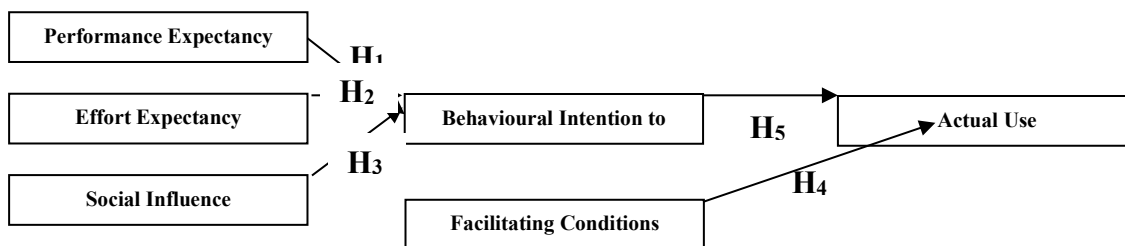
In today's data world, most of the apps collect user data, AI collecting user data and using it can be dangerous at times (Berendt et al., 2020). Another concern is associated with algorithm bias. It is another area of concern in AI-enabled learning (Borenstein & Howard, 2020). One major area of concern using AI in educational setting is the concern regarding its impact on thinking abilities of educators and learners. There have been multiple discussions on the impact of Artificial Intelligence on the critical thinking of the individuals using it. The discussions are two-faceted; few arguments suggest that AI fosters critical thinking enhancing the creativity of the users, where as other arguments undermines this and suggest that use of Artificial Intelligence reduces critical thinking of individuals and decreases the creative spirit of the individuals. Whichever may be true, it is evident that, there is a significant impact of Artificial Intelligence on the critical thinking and creativity of the users either ways (Spector and Ma, 2019; Borenstein & Howard, 2020; Bogina et al., 2021; Maes, 2023; Parsakia, 2023). In this context, it is important to study this area and pin point its existence in our educational setting, specifically for the educators of rural areas of Sambalpur.

At this juncture, when the whole world is oriented towards AI and its impact, it is important for us assess the educators perceptions and intention towards its adoption and use (Ayanwale et al., 2022). One of the major reasons for assessing the educator's readiness is because most of the tasks are being converted to Ai-integrated tasks including educational institutions (Roy et al., 2022). Considering educators, multiple attributes shape their perception regarding use of AI. One among many is technological knowhow (Lin et al., 2022). The technological knowledge of the educators is not equal; it varies along with age, gender and demography of

the educator. There lies a technical knowledge disparity among Indian educators which leads to varied perceptions among them (Mishra, 2023). Another attribute shaping the educators perception of Artificial Intelligence is their surroundings; which includes their peers, family and friends and their shared perception influences the behavioural intention of the educators towards AI (AlGerafi et al., 2023). These literatures suggests that there is a need to understand educators readiness for adopting AI in their educational settings to find areas of lacking and improve them to make ready for a AI future. The objectives are to study the readiness of educators in rural areas of Sambalpur for adopting Artificial Intelligence for their teaching practices and find areas of improvement.

Theoretical Framework

The study is deeply rooted in Venkatesh et al. (2003) Unified Theory of Acceptance and Use of Technology. The study utilizes the UTAUT model to analyze the educator's readiness applying the attributes to the study's context. As UTAUT is widely used for analyzing the technology acceptability, we have adopted this model for our study (Williams et al., 2015). The model's attributes have been proved to deduce the behavioural intention and use of technology (Venkatesh et al., 2016). The performance expectancy (PE) holds the educator's perception of the usage and utility of the Artificial Intelligence in delivering their services The Expect Expectancy implies the perception of the educators relating to their perceived effort in adopting AI-technology. The influence of the peers, friends and to some extent, students shapes the Social influence of the educators which impacts the AI adoption. Along with this the facilitating conditions such as, technological knowledge, Government support, trainings etc shapes the perception of theses educators. All of this leads to Behavioural Intention leading to the actual use of technology (Kundu et al., 2021; Raffaghelli et al., 2022; Singh, 2023; Zhang & Wareewanich, 2024; Shahid et al., 2024).



Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003)

As from this model, the hypotheses adopted for the study are:

H₁: Performance Expectancy significantly affects the behavioural intention of the educators of rural areas of Sambalpur in adopting AI.

H₂: Effort Expectancy significantly affects the behavioural intention of the educators of rural areas of Sambalpur in adopting AI.

H₃: Social Influence significantly affects the behavioural intention of the educators of rural areas of Sambalpur in adopting AI.

H₄: Facilitating Conditions significantly affects the use of AI by the educators of rural areas of Sambalpur.

H_s: Behavioural Intention significantly affects the use of AI by the educators of rural areas of Sambalpur.

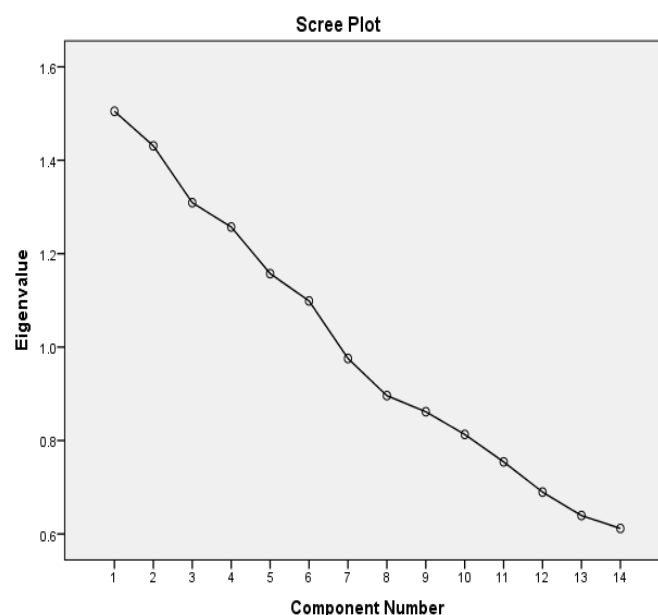
Methodology

In this study, we have adopted a quantitative approach to analyze the educators' readiness in adopting Artificial Intelligence in rural areas of Sambalpur. Data was collected from all nine blocks of Sambalpur district using stratified random sampling making sure that the sample represents the population properly. Exploratory Factor Analysis is employed to identify factors which affect the educators' perception and use of AI-technology in their work. UTAUT model's attributes are adopted to test their perception regarding AI-technology adoption. The questionnaire is prepared keeping in view UTAUT's attributes and the scale is adopted post testing for the validity and reliability. Data was collected from 150 educators from the rural areas of Sambalpur.

Analysis & Interpretation

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.704
Bartlett's Test of Sphericity	Approx. Chi-Square	82.742
	df	91
	Sig.	.720

The KMO and Bartlett's Test showed a value of .704 signifying that the Exploratory Factor Analysis is suitable for the study. However, the KMO-Bartlett's test also revealed that the correlation between the factors is less, which is advantageous for the study as each factor is different and presents unique attribute of the educators of using AI-technology in rural areas of Sambalpur.



The Scree-Plot from EFA shows six points above the Eigen-Value of one. It suggests that there are six components which explain the educator's readiness towards AI-Technology in their educational setting. Using Varimax-rotation the factors were analyzed which showed six components (as shown in Scree-Plot) showing significant loadings on factors like "Sufficient Support for AI", "Best Use of AI", "Previous Technology Use" and "Familiarity with AI" showcasing that the educator's knowledge of AI-Technology and their experience with Technology in general shapes their perception of AI-Technology and leads to the actual use of the technology.

Rotated Component Matrix^a						
	Component					
	1	2	3	4	5	6
Subjects Taught						
Attitude Towards Technology						
Familiarity with AI				.665		
Belief in AI Impact			.487	.497		
Previous Technology Use			.665			
Challenges with Technology	.572					
Main Challenges in AI Integration		.656				
Sufficient Support for AI					.847	
Training in Technology & AI						
Interest in AI Training						
Best Use of AI		.739				
Concerns about AI					.499	.486
AI for Educational Disparity	.434					
Additional Support Needed						

Extraction Method: Principal Component Analysis.

*Rotation Method: **Varimax with Kaiser Normalization.***

a. Rotation converged in 17 iterations.

Component-1 shows a significant loading on the factors Challenges with Technology (.572) and AI for Educational Disparity (.434) shows that the educator's orientation is shaped by the expectations of the educators of the AI-Technology's output in their educational settings. This component relates to UTAUT's Performance Expectancy attribute. Main Challenges in AI Integration (.656) and Best Use of AI (.739) shows significant loadings for Component-2 suggesting that attributes which shape the use of the technology for practical purpose which is structured by their interactions and prejudices to adopt the technology which is similar to UTAUT's Social Influence. Component-3 and Component-4 loads on Belief in AI Impact (.487), Previous Technology Use (.665) and Familiarity with AI (.665), Belief in AI Impact (.487) respectively showing that this component is directed from the educator's perception and hand on experience with technology exhibiting their direction of orientation which is familiar with UTAUT's Behavioural Intention which is shaped by previous experience to a large extent. Sufficient Support for AI adoption (.847) and Concerns about AI (.499) loads significantly for Component-5, which shows the educator's perceived value of the AI; supported by the facilities and support available to them. It is similar to UTAUT's Facilitating Conditions. Component-6 loads only for Concerns about AI (.499) showing that the educator's perceived effort and outcome of the AI-Technology in their educational setting is influencing their use of these technologies.

Having derived the factors affecting the educator's perception regarding use of the technologies in their educational settings, it is important to test whether these attributes affect the educator's actual use of the technologies. Using the UTAUT model, we have tested the same.

Hypothesis	β	Standard Error of β	t	p	R ²
H ₁	0.377	0.040	9.522	<0.000	0.481
H ₂	0.247	0.050	4.954	<0.000	0.200
H ₃	0.232	0.050	4.591	<0.000	0.177
H ₄	0.442	0.028	15.955	<0.000	0.722
H ₅	0.243	0.092	2.633	0.060	0.066

The regression analysis was used to test the hypotheses using UTAUT models relationship of the factors. For Hypothesis-1 the relationship between Performance Expectancy and Behavioural Intention of the educators of rural areas of Sambalpur in adopting AI was tested which showed a significant relationship ($\beta = 0.377$, $p < 0.000$, $R^2 = 0.481$). Similarly for Hypothesis-2, Hypothesis-3 and Hypothesis-4 showed significant values indicating towards a strong relationship between the variables. However, Hypothesis-5, contrary to the model showed a non-significant value ($\beta = 0.243$, $p = 0.060$, $R^2 = 0.066$) indicating at a non-dependable

relationship of the variables Behavioural Intention and use of AI by the educators of rural areas of Sambalpur; showing a dimension further needed to be studied extensively.

Hypothesis	Description of the Relationship	Result
H_1	Performance Expectancy significantly affects the behavioural intention of the educators of rural areas of Sambalpur in adopting AI	Accepted
H_2	Effort Expectancy significantly affects the behavioural intention of the educators of rural areas of Sambalpur in adopting AI	Accepted
H_3	Social Influence significantly affects the behavioural intention of the educators of rural areas of Sambalpur in adopting AI	Accepted
H_4	Facilitating Conditions significantly affects the use of AI by the educators of rural areas of Sambalpur	Accepted
H_5	Behavioural Intention significantly affects the use of AI by the educators of rural areas of Sambalpur	Rejected

Findings & Conclusion

The study revealed that the educator's perceived value of AI usage significantly affects the actual usage. Factors such as Sufficient Support for AI adoption, Concerns about AI, AI Integration, Best Use of AI and Main Challenges in AI Integration justifies that the educators' intention is in the direction of AI usage. However, an interesting dimension was revealed, which is proved by Hypothesis-5. It shows that, however ready the educators are, however strong their perception might be regarding AI-Technology usage; the behavioural intention need not drive the actual usage of the technology. This shows that, other than the concerns, thoughts and perceptions; various others factors may have their influence on the usage of AI-Technology usage by the educators. For theoretical parameters, the rejection of Hypothesis-5 shows an area of improvement in the theory and further studies can be attributed to it adding new parameters influencing the actual usage. Our study will further continue on this area to identify other dimensions directing the actual usage of AI-Technology by the educators in rural areas of Sambalpur.

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