**Postgraduate Students' Perceptions of E-Learning in Rajasthan's Agricultural Universities**

**ABSTRACT**

This study examined how postgraduate students from two agricultural universities in Rajasthan felt about e-learning, especially during the COVID-19 pandemic when online classes became the only option. One hundred fifty students (150) were surveyed to understand their experiences, challenges, and opinions. The findings showed that while students liked the flexibility, time-saving, and access to learning materials offered by e-learning, many also struggled with issues like eye strain, stress, internet problems, and isolation. Some found it hard to stay focused or interact with teachers and classmates. However, e-learning also helped students improve their computer and technical skills. The study used factor analysis to group student responses into five main areas: health and social concerns, time management, ease of access, technology use, and concentration levels. The results highlight the need to improve online learning systems by combining digital tools with better student support and teacher engagement to ensure better learning outcomes.

**Keywords: E-learning, Student Perception, Online Education Challenges, Higher Education in India**

**INTRODUCTION**

Information and Communication Technology (ICT) integration has profoundly transformed the educational landscape, leading to the widespread adoption of e-learning across various academic levels. E-learning, a learning system leveraging electronic resources such as computers and the internet, offers a flexible and accessible environment for knowledge transfer and skill development (Chen & Reyes, 2024). While not a nascent concept, its prominence, particularly in postgraduate education, has been significantly amplified by global events like the COVID-19 pandemic, which necessitated a rapid shift to virtual learning models worldwide (Mathivanan et al., 2021). This transition underscored the critical role of e-learning in ensuring educational continuity. It highlighted its potential to offer "learning anytime and anywhere," reducing traditional barriers of time, location, and even socio-economic factors (Du et al., 2019; Richardson & Swan, 2003).

Understanding postgraduate students' perceptions of e-learning is paramount for several reasons. Firstly, their engagement and success in this evolving educational paradigm are heavily influenced by their experiences and attitudes. Since e-learning requires new skills like thinking critically, researching, and evaluating information, it is important to understand how students see these challenges for new pedagogy (Culduz, 2024). Secondly, India has one of the largest higher education systems in the world (Gope et al., 2021). It has increasingly adopted online learning, so it is important to see how this has affected education. Addressing concerns such as the perceived lack of human interaction (Culduz, 2024), potential distractions, and technology access or proficiency challenges is essential for optimising e-learning environments.

The effectiveness of e-learning depends not solely on student perception but also on institutional and instructor readiness. The emergency transition during the pandemic was essentially a form of "emergency remote teaching" rather than thoughtfully designed online learning (Hodges et al., 2020). This difference matters because effective e-learning is not just about uploading lectures. It calls for specific teaching strategies that go beyond simply posting materials online. For postgraduate students, who often depend on mentorship and detailed academic discussions, the quality of their interactions and instructor feedback in a virtual setting plays a crucial role in shaping their overall learning experience (Bao, 2020). Institutions should prioritise faculty training to enhance their skills as online facilitators, emphasising the importance of building a community and encouraging intellectual engagement in digital environments.

Another layer of complexity, especially in a diverse country like India, is the digital divide. While e-learning aims to make education more accessible to everyone, it faces challenges due to unequal access to high-speed internet and appropriate digital devices (Panda & Mishra, 2007). This unequal distribution can lead to new unfairness, particularly affecting students in remote or economically disadvantaged areas who may find it difficult to engage fully. For postgraduate research scholars needing access to specialised software or large datasets, inconsistent connectivity can hinder their academic progress. Therefore, any policy or institutional strategy for e-learning must incorporate measures to ensure fair access and bridge this technological divide.

Ultimately, the goal is to move towards a sustainable and effective model that harnesses the benefits of technology without compromising pedagogical quality. Many researchers suggest that a blended learning model, which combines the flexibility of online learning with the valuable interaction of face-to-face sessions, may be the most effective path forward for postgraduate education (Garrison & Kanuka, 2004). Such a model can foster the self-regulated learning skills essential for lifelong learning while preserving the vital student-instructor and peer-to-peer relationships that are the bedrock of advanced education. As Indian universities explore new ways of teaching, ongoing research into postgraduate students' experiences will be indispensable for creating e-learning ecosystems that are both technologically advanced and inclusive, engaging, and effective.

This research paper explores postgraduate students' perceptions of e-learning and identifies the factors influencing these perceptions. Specifically, the study seeks to analyse the perceptions of PG students at SKRAU, Bikaner, and MPUAT, Udaipur, about their socioeconomic status, and to document their recommendations for enhancing e-learning platforms. The significance of this study lies in its contribution to understanding the lived experiences of postgraduate students with e-learning, particularly within agricultural universities in Rajasthan. The findings will provide valuable insights for educators, policymakers, and institutions to overcome implementation challenges, improve the design and delivery of e-learning programs, and ultimately foster a more effective and supportive virtual learning experience for future generations of postgraduate students.

**METHODOLOGY**

This descriptive research study collected primary data from postgraduate (PG) students.

**Locale of the Study**

The study was conducted at the constituent colleges of Swami Keshwanand Rajasthan Agricultural University (SKRAU), Bikaner, and Maharana Pratap University of Agriculture and Technology (MPUAT), Udaipur. These universities were purposively selected due to the following reasons:

* SKRAU (1988) and MPUAT (1999) are Rajasthan's oldest agricultural universities, respectively.
* They have the highest number of PG students in agriculture.
* No similar study has been conducted in these universities to date.
* SKRAU was the first university in Rajasthan to initiate a PG program.

**Selection of Colleges**

Three colleges with the highest number of PG students were selected from the five colleges under SKRAU, Bikaner, that offer PG programs. Similarly, two colleges with the highest number of PG students were selected from the six colleges under MPUAT, Udaipur, that offer PG programs.

**Sampling and Selection of Respondents**

A total of 150 respondents were selected using a proportionate random sampling method. This included 86 respondents from MPUAT, Udaipur, and 64 from SKRAU, Bikaner.

**Data Collection**

To achieve the study's objectives, both primary and secondary data were collected. Primary data were gathered through personal interviews using a pre-structured schedule. Secondary data were collected from research papers, articles, websites, journals, and government databases.

**Statistical Measure**

The collected data underwent both qualitative and quantitative analysis. Tabulated data were analysed to yield relevant information consistent with the study's objectives.

**Factor Analysis**

Factor Analysis, specifically using Principal Component Analysis (PCA), was performed on the cleaned data from an Excel spreadsheet, which was then fed into IBM SPSS Statistics (Saharan *et al.,* 2023). This method was applied to identify various factors influencing e-learning. PCA was utilised to obtain factor loadings, with its primary purpose being to determine the most important factors influencing e-learning. The component model is expressed as follows:

*Xi = Ai1 Fi + Ai2 F2 + Ai3 F3 + ... + Aim Fm + Vi Ui*

Where

*Xi* = *i*th standardised variable

*Aij* = standardised multiple regression coefficient of variable *i* on common factor *j*

*F* = common factor

*Vi* = standardised regression coefficient of variable *i* on unique factor *i*

*Ui* = the unique factor for variable *i*

*m* = number of common factors

The unique factors are correlated with each other and with the common factors. The common factors themselves can be expressed as linear combinations of the observed variables:

*Fi = Wi1 X1 + Wi2 X2 + Wi3 X3 + ... + Wik Xk*

Where

*Fi* = estimate of *i*th factor

*Wi* = weight or factor score coefficient

*k* = number of variables

**RESULT AND DISCUSSION**

The study aimed to understand the perception of postgraduate (PG) students from SKRAU, Bikaner, and MPUAT, Udaipur, towards e-learning, particularly in the context of its adoption during the COVID-19 pandemic. Using Principal Component Analysis (PCA) for factor extraction revealed meaningful dimensions influencing e-learning experiences. The Kaiser-Meyer-Olkin (KMO) value of 0.889 and Bartlett’s Test of Sphericity (χ² = 1798.77, p < 0.001) confirmed sampling adequacy and justified the use of PCA.

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| **Table1.KMO and Bartlett's Test** |
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | .889 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1798.772 |
| df | 276 |
| Sig. | .000 |

 **1. Factor Extraction and Explanation**

Five key components emerged after rotation, cumulatively explaining 63.47 per cent of the total variance. Each represents a different dimension of students’ e-learning experience.

**Table2. Total Variance Explained**

|  |  |  |  |
| --- | --- | --- | --- |
| Component | Initial Eigenvalues | Extraction Sums of Squared Loadings | Rotation Sums of Squared Loadings |
| Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 9.008 | 37.533 | 37.533 | 9.008 | 37.533 | 37.533 | 4.156 | 17.318 | 17.318 |
| 2 | 2.159 | 8.997 | 46.530 | 2.159 | 8.997 | 46.530 | 3.277 | 13.655 | 30.973 |
| 3 | 1.633 | 6.805 | 53.335 | 1.633 | 6.805 | 53.335 | 3.176 | 13.234 | 44.207 |
| 4 | 1.319 | 5.495 | 58.830 | 1.319 | 5.495 | 58.830 | 2.623 | 10.929 | 55.136 |
| 5 | 1.114 | 4.641 | 63.471 | 1.114 | 4.641 | 63.471 | 2.000 | 8.335 | 63.471 |
| 6 | .929 | 3.871 | 67.341 |   |   |   |   |   |   |
| 7 | .811 | 3.377 | 70.718 |   |   |   |   |   |   |
| 8 | .717 | 2.986 | 73.704 |   |   |   |   |   |   |
| 9 | .664 | 2.768 | 76.472 |   |   |   |   |   |   |
| 10 | .637 | 2.654 | 79.126 |   |   |   |   |   |   |
| 11 | .554 | 2.309 | 81.435 |   |   |   |   |   |   |
| 12 | .542 | 2.259 | 83.693 |   |   |   |   |   |   |
| 13 | .482 | 2.007 | 85.700 |   |   |   |   |   |   |
| 14 | .434 | 1.808 | 87.508 |   |   |   |   |   |   |
| 15 | .413 | 1.720 | 89.228 |   |   |   |   |   |   |
| 16 | .400 | 1.666 | 90.894 |   |   |   |   |   |   |
| 17 | .370 | 1.542 | 92.436 |   |   |   |   |   |   |
| 18 | .343 | 1.431 | 93.867 |   |   |   |   |   |   |
| 19 | .313 | 1.305 | 95.172 |   |   |   |   |   |   |
| 20 | .294 | 1.225 | 96.397 |   |   |   |   |   |   |
| 21 | .245 | 1.020 | 97.416 |   |   |   |   |   |   |
| 22 | .240 | 1.000 | 98.417 |   |   |   |   |   |   |
| 23 | .220 | .916 | 99.333 |   |   |   |   |   |   |
| 24 | .160 | .667 | 100.000 |   |   |   |   |   |   |
| Extraction Method: Principal Component Analysis. |

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|   **Table 3-Communalities** |
|  Statements | Initial | Extraction |
| You are very comfortable with the e-learning technology provided by your university. | 1.000 | .630 |
| E-learning needs more concentration than offline classroom learning. | 1.000 | .600 |
| The course resources and materials were easily accessible during the e-learning. | 1.000 | .563 |
| Whenever you had any doubt, the teacher/instructor cleared our doubt timely in that e-learning session itself. | 1.000 | .497 |
| You are feeling that sufficient amount of time is not allocated for individual interaction in the e-learning. | 1.000 | .620 |
| E-learning, restricted you to make new friends and barricade to maintain the existing friendship. | 1.000 | .734 |
| The navigation route provided by the e-learning technology was not easy to use. | 1.000 | .666 |
| E-learning causes more distractions than the offline classroom learning. | 1.000 | .685 |
| E-learning has comparatively expanded your technical skill (creating e-mails/ assessing mobile applications, handling ICT tools etc.) than offline classroom learning. | 1.000 | .656 |
| Comparing offline classroom learning, e-learning had reduced taking notes since the course materials are available before the course starts. | 1.000 | .652 |
| E-learning helped us to study anywhere at any time. | 1.000 | .648 |
| E-learning has reduced the cost and learning time compared to offline classroom learning. | 1.000 | .683 |
| Lack of basic knowledge of computer, mobile and internet skills on handling e-learning technology tools for you act as a drawback. | 1.000 | .610 |
| E-learning provides the same experience of the offline classroom learning. | 1.000 | .705 |
| E-learning motivated me to search and take more online courses offered other than your university. | 1.000 | .578 |
| E-learning made the interaction between teacher/instructor easier and frequent than the offline classroom learning. | 1.000 | .619 |
| Mobile data pack management became a real tension, since after the introduction of online classes the most of the mobile data you were using for online classes this makes difficult for you to use the mobile data for other purposes. | 1.000 | .522 |
| In e-learning, teacher/instructor are conveying the concepts effectively than offline classroom learning. | 1.000 | .684 |
| Due to e-learning, now days more psychical and mental stress has been created. | 1.000 | .668 |
| Due to e-learning, now a days you often get eye problems. | 1.000 | .604 |
| E-learning had created you more opportunities to reflect on what you have learned in online classes than offline classroom learning. | 1.000 | .662 |
| Assessment of academic progress is more accurate in e-learning than offline classroom learning. | 1.000 | .554 |
| E-learning created a social isolation. | 1.000 | .744 |
| You overall had a very good experience with the e-learning. | 1.000 | .648 |
| Extraction Method: Principal Component Analysis. |

###  **Factor 1: Social and Health Concerns**

This factor included items related to physical and mental stress, social isolation, eye strain, and distractions. It reflects how e-learning negatively impacts students’ health and social well-being. High loadings on items like *“Due to e-learning, nowadays more physical and mental stress has been created”* (0.693) and *“E-learning created a social isolation”* (0.816) underline these concerns.

These results are consistent with global studies reporting increased psychological stress, loneliness, and physical discomfort due to excessive screen time and lack of physical socialisation in online education (Mheidly et al., 2020; Wang et al., 2020). As per Kulkarni (2024), prolonged exposure to screen-based learning, compounded by inadequate physical activity, causes fatigue and cognitive overload.

**Factor 2: Time Management**

This factor emphasises flexibility in learning, efficient resource access, and reduced logistical burden. For example, *“E-learning helped us to study anywhere at any time”* (0.688) and *“E-learning has reduced the cost and learning time compared to offline classroom learning”* (0.750).

This aligns with findings from Anderson (2008), who highlighted that asynchronous e-learning facilitates self-paced learning and greater flexibility in managing time and resources. Moreover, revisiting materials and learning at one's convenience enhances autonomy and reduces stress associated with rigid schedules.

### **Factor 3: Accessibility and Learning Efficiency**

This dimension captures students' satisfaction with access to resources, instructor support, and overall learning convenience. Items such as *“The course resources and materials were easily accessible”* (0.513) and *“Instructor cleared doubts timely”* (0.511) underscore this factor.

The students acknowledged that e-learning improved their access to educational resources, corroborating past studies emphasising how ICT and e-learning enable inclusive access regardless of geographical constraints (Dhawan, 2020). However, accessibility is also conditional on internet connectivity and infrastructure, which could create a digital divide.

### **Factor 4: Tech-How (Technical Capability and Usability)**

This factor relates to both the ease of using e-learning platforms and the digital skills developed through their usage. Students agreed that e-learning enhanced their technical abilities (loading = 0.722), but also expressed concerns over issues like *navigation difficulties* (0.678) and *lack of prior ICT knowledge* (0.539).

These results mirror the dual nature of ICT in education—it provides opportunities for skill development but simultaneously poses challenges for students with limited technical exposure. Rohayani et al. (2015) observed that technological readiness plays a critical role in determining the success of e-learning systems.

### **Factor 5: Cognitive and Instructional Engagement**

The final factor focuses on cognitive outcomes and instructional clarity. Statements like *“E-learning needs more concentration than offline classroom learning”* (0.700) and *“Instructor conveys concepts more effectively in e-learning”* (0.684) represent a paradoxical perspective where students find e-learning both demanding and beneficial in terms of content delivery.

It suggests that although students must be more self-disciplined and attentive in online learning, they may also benefit from repeated exposure to pre-recorded or structured digital content, which supports deeper understanding (Means et al., 2013).

This analysis concludes that while students generally had a positive overall experience with e-learning (as evidenced by the high loading of 0.716), several challenges persist, especially concerning mental well-being, social interaction, and technological barriers. These findings align with national and international research on the sudden shift to virtual learning during COVID-19 (Jena, 2020; Eslamian et al., 2023).

**CONCLUSION**

The study found that most students had a positive experience with e-learning, especially enjoying the flexibility to study anytime and anywhere. It helped many improve their technical skills and also save their time and money. However, students also faced problems like eye strain, stress, lack of interaction, and poor internet access. Some felt lonely and missed making friends. While e-learning made learning easier in some ways, it also brought new challenges. To make it better, Universities should focus on improving technical support, teacher-student interaction, and mental well-being. Blending online learning with personal support can give students the best learning experience. Policymakers should focus on bridging the digital divide with proper infrastructure development in rural and remote areas. There is also a need to set quality standards for e-learning.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that no generative ai technologies such as large language models (chatgpt, copilot, etc.) And text-to-image generators have been used during the writing or editing of this manuscript

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