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PAPER

A study of e-learning motivation in Haryana, India: do gender and locality matter?

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ABSTRACT

This study explores undergraduate students' motivation for e-learning in Haryana, India, considering gender (male and female) and locality (urban and rural) differences. Data was collected from a random sample of 400 students enrolled in colleges. The results indicate that female and rural students demonstrated higher levels of motivation than male and urban students, revealing significant differences. The study emphasises the importance of addressing digital infrastructure challenges and providing focused support to enhance e-learning participation among diverse student groups, ensuring fair access to educational opportunities.

The practical implications of this research suggest that by implementing tailored interventions, educational institutions and policymakers can enhance student engagement and outcomes. This can lead to a more effective educational environment that benefits a wide range of learners. To achieve this, they should focus on bridging the digital gap among diverse groups and adopting strategies that create supportive e-learning environments for all students.

KEYWORDS: e-learning motivation, digital learning, online education, gender differences, digital education, digital divide.

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Introduction

E-resources like online courses, digital textbooks, and educational websites have revolutionised education worldwide by providing flexible and easily accessible learning

materials. E-learning, which involves instruction delivered electronically via the Internet to learners who are physically separated from the instructor (Singh & Thurman, 2019), is especially important in India as the country needs to increase access to higher education. At present, the Gross Enrolment Ratio (GER) for higher education in India is 26.3%, which indicates that only around a quarter of the eligible population has enrolled in higher education. The National Education Policy 2020 aims to raise GER to 50% by the year 2030, and e-learning will play a significant role in accomplishing this target (Ministry of Human Resource Development, 2020).

India has a large population and is a developing country with a significant proportion of young people. However, resources for educating this vast population remain limited. E-learning offers a promising solution to address this challenge by providing scalable and accessible education. Recognising this potential, the Indian government is actively expanding its digital infrastructure to ensure that quality education reaches even the most remote areas (BW Online Bureau, 2025).

As the use of e-learning is growing, it becomes necessary to understand students' motivation for using it. Motivation directly impacts students' participation and their success in virtual learning environments (Ryan & Deci, 2000). Motivated students are more likely to complete online courses and also perform well academically (Artino, 2008). Female learners often report lower self-efficacy in online learning due to societal barriers, but interventions such as peer mentoring can enhance their engagement (Rockinson-Szapkiw et al., 2022). Therefore, educators and policymakers must focus on strategies that boost motivation and ensure that students make the most of e-learning opportunities.

In Haryana, specifically in the context of higher education, there is a notable lack of research into students' motivation towards e-learning. The state's literacy rate is approximately 75.6% as per the 2011 census (lower than the national average of 77.7%), and its college GER of 21.2% for higher education in Haryana (below the national average of 26.3% and the 2030 target of 50%) highlight a critical need for alternative educational pathways (Office of the Registrar General & Census Commissioner, 2011; Ministry of Education, 2020). However, with the increasing use of online resources, there is potential to address this gap by enrolling more students in higher education through online learning (Muthuprasad et al., 2021). Rural students, who often experience slower internet speeds and limited access to devices, exhibit

different motivational drivers compared to their urban counterparts. This disparity underscores the need for e-learning programmes tailored to locality-specific challenges (Zhao et al., 2022). By regularly assessing students' motivation for e-learning, strategies can be developed to better meet their needs and preferences (Innab & Alqahtani, 2023). This knowledge can guide the creation of user-friendly e-learning environments that provide equal opportunities for success (Al-Fraihat et al., 2020).

Studies on gender differences in e-learning have yielded mixed results. While earlier work suggested male students might benefit more from greater exposure to technology, a recent large meta-analysis found only very small and inconsistent gender differences across global contexts (Yu & Deng, 2022). Similarly, stronger digital infrastructure and resources in urban areas (vs rural) can enhance online learning access and motivation; for example, among Indian schools during the COVID-19 period students in rural settings experienced far lower connectivity and device access (Sarkar et al., 2022) and rural female undergraduates reported less digital autonomy compared to their urban counterparts (R & Radha, 2024). Nevertheless, these findings need further exploration, which is the focus of this research.

The digital divide and unequal learning opportunities between gender and locality are global challenges that demand scholarly attention, particularly in the context of expanding digital education initiatives.

Motivation and e-learning

E-learning has gained worldwide popularity due to its flexibility, accessibility, and convenience. Motivation is a crucial factor that drives students' engagement and success in online learning environments. According to self-determination theory (Ryan & Deci, 2000), motivation stems from intrinsic (internal factors such as curiosity, personal interest, and mastery) and extrinsic (external rewards like grades, career advancement, and social recognition) sources. Learners engage best when their three core psychological needs are met: autonomy (control over their learning process), competence (confidence in their ability to succeed), and relatedness (a sense of belonging and meaningful connection with peers and instructors) (Deci & Ryan, 1985; Ryan & Deci, 2000). Motivation plays a significant role in how much time and effort students dedicate to learning, especially in online environments where independent study is necessary (Artino, 2008). Students who are motivated by personal

interest often demonstrate increased engagement and satisfaction in their e-learning experiences. Additionally, well-designed and accessible e-learning platforms further enhance motivation by creating user-friendly environments that promote continued engagement (Aparicio et al., 2016). Similarly, the success of e-learning systems is closely tied to how well these platforms meet the motivational needs of learners, highlighting the importance of user-friendly design and high-quality digital content (Al-Fraihat et al., 2020).

Emerging technologies like artificial intelligence and virtual reality in e-learning environments can enhance learner engagement by offering immersive and interactive experiences. These findings imply that using advanced digital tools can better meet students' psychological needs and promote deeper learning (Mensah et al., 2024; Yu & Deng, 2022).

One specific strategy to enhance learner motivation in e-learning is the integration of gamification – using game-like elements such as points, badges, leaderboards, and challenges. These features can increase motivation by fostering a sense of achievement, competition, and enjoyment, which can lead to higher engagement and persistence (Dichev & Dicheva, 2017).

E-learning plays a key role in bridging the digital divide, especially in rural areas where traditional education faces numerous infrastructural challenges (R & Radha, 2024; Tewari & Tewari, 2025). Factors like digital literacy and the availability of technological resources are also crucial in boosting learners' motivation toward online education (Vanitha & Alathur, 2021). In contexts where students face barriers such as limited internet connectivity, creating supportive and accessible e-learning environments becomes even more critical (Ehsan & Zaidan, 2024; Kew et al., 2018).

By examining motivation across different demographics, it becomes clear that motivation for e-learning is multifaceted and shaped by various factors such as location, access to technology, and institutional support. While gender has been explored in several studies, the findings remain inconsistent, suggesting that its influence on motivation is still uncertain. Therefore, holistic strategies that consider both personal and external factors are essential for supporting student motivation and promoting equitable participation in digital learning environments.

Objectives

1. To study the motivation of undergraduate students towards e-learning.
2. To compare the motivation of undergraduate students towards e-learning based on gender (male and female).
3. To compare the motivation of undergraduate students towards e-learning based on locality (urban and rural).

Hypotheses

H1. Female undergraduate students have significantly higher motivation towards e-learning than male undergraduate students.

H2. Rural undergraduate students have significantly higher motivation towards e-learning than urban undergraduate students.

Research methodology

This study employed a quantitative descriptive survey to collect data from undergraduate students in Haryana. The population for this study consisted of undergraduate students from various colleges in Haryana, India. A sample of 400 undergraduate students (2nd and 3rd year) aged 19 to 24, was selected using a stratified random sampling technique. This approach ensured adequate representation of both genders (200 male and 200 female) and localities (197 urban and 203 rural students).

To assess students' motivation for e-learning, this study used the Motivation to Learn Online Questionnaire (MLOQ), developed by Shawn Fowler (2007, 2018). The MLOQ was chosen over other existing tools, including the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich et al., 1991), the Online Student Engagement scale (OSE) (Dixson, 2015), and the Online Learning Readiness Scale (OLRS) (Hung et al., 2010). Unlike these instruments, the MLOQ is specifically designed for online learning environments, providing a concise yet comprehensive framework suited to this study's objectives. Its inclusion of dimensions such as intrinsic and extrinsic motivation, self-efficacy, and social engagement makes it particularly relevant for evaluating students' online learning experiences. Its design closely aligns with the study's focus, making it a valuable tool for assessing e-learning motivation.

The questionnaire evaluates seven dimensions of motivation, each of which plays a critical role in influencing learner engagement and success:

- Intrinsic goal orientation measures motivation driven by internal interest or the desire to master content for personal satisfaction.
- Extrinsic goal orientation assesses the extent to which students are motivated by external outcomes such as grades or career benefits.
- Control of learning beliefs reflects students' belief that their own effort and strategies determine academic success.
- Self-efficacy gauges students' confidence in their ability to complete academic tasks in online settings.
- Task value captures students' perceptions of the usefulness, relevance, or importance of the learning material.
- Social engagement examines motivation related to peer interaction and collaborative learning.
- Instructor support assesses the motivational role of teacher feedback, encouragement, and presence in online environments.

Each dimension is assessed using multiple items on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

To ensure the questionnaire was culturally and contextually appropriate for Indian students, it was first translated into Hindi and then back-translated to verify accuracy while preserving the integrity of the original content. Following this, a thorough review was conducted to assess the questionnaire's clarity, relevance, and suitability for the target population, ensuring it effectively captured students' experiences and perspectives within the Indian e-learning context. Additionally, pilot testing (n = 124) was conducted to validate its applicability.

The final version of the MLOQ showed high reliability, confirmed through the split-half method (0.979) and Cronbach's Alpha ($\alpha = 0.97$). This indicates strong internal consistency, making it well-suited for assessing e-learning motivation among undergraduate students in India.

Data collection

Data were collected via Google Forms from various colleges across five districts in Haryana: Ambala, Kaithal, Karnal, Panipat, and Yamunanagar. Respondents were asked to rate their level of agreement or disagreement with statements to measure motivational factors on a five-point Likert scale. Students were informed about the purpose of the study and assured that their responses would be kept confidential. Participation was entirely voluntary. No personally identifiable information was gathered. All sources and measurement tools used in the research were properly cited and acknowledged to avoid plagiarism and ensure academic integrity.

Limitations

1. The participants of the study may be biased about their motivation levels and may have provided socially desirable responses. In order to validate the quantitative findings, future studies should incorporate qualitative methods such as interviews or focus groups.
2. There can be many factors, like cultural, economic, and institutional differences, that may influence e-learning motivation among students belonging to different regions. In order to have a more comprehensive understanding of these dynamics, comparative studies across multiple regions can be conducted in future.
3. This study did not account for variables like socio-economic status, parental education levels and access to technological resources, which could greatly impact motivation. These factors can be included in future to have a deeper understanding of how external influences affect engagement in e-learning.
4. Finally, while the study highlights gender and locality differences, it does not explore the interconnectedness of these factors with other demographic variables, such as age or field of study.

Findings

Before presenting the findings, it is essential to clarify the key terms used in this analysis. In this study, e-learning adoption refers to students' initial decision to begin using e-learning tools, measured by whether they used any digital learning resources. E-learning integration indicates the extent to which e-learning is incorporated into students' regular

study routines, measured by the self-reported percentage of total study supported by e-learning. E-learning engagement refers to the quality and depth of students' interaction with digital learning materials, as captured through the motivational dimensions of the MLOQ.

In addition to motivational data collected via the MLOQ, the survey gathered demographic information on students' patterns of e-learning adoption (initial uptake of digital tools) and integration (extent of usage in regular studies) over the past decade, along with the percentage of their studies supported by e-learning. Insights reveal notable differences in these patterns across gender and locality. Urban and male students showed higher initial adoption rates, while rural and female students demonstrated more consistent integration of digital resources over time.

Key trends in e-learning engagement over the past two to three years are:

- E-learning adoption showed variability, with 54 rural and 61 urban students in Year 2, decreasing to 51 rural and 50 urban students in Year 3.
- Urban students displayed higher integration levels, with 45 urban students relying on e-learning for 70% of their study compared to fewer rural students at this usage level.
- Gender differences emerged, with female students reaching a peak of 50% integration (36 females) and male students reaching full integration at 100% (25 males).
- Male students demonstrated higher initial adoption rates in Year 2 (64 males vs. 51 females).

Figure 1. E-learning adoption among students (rural vs. urban).

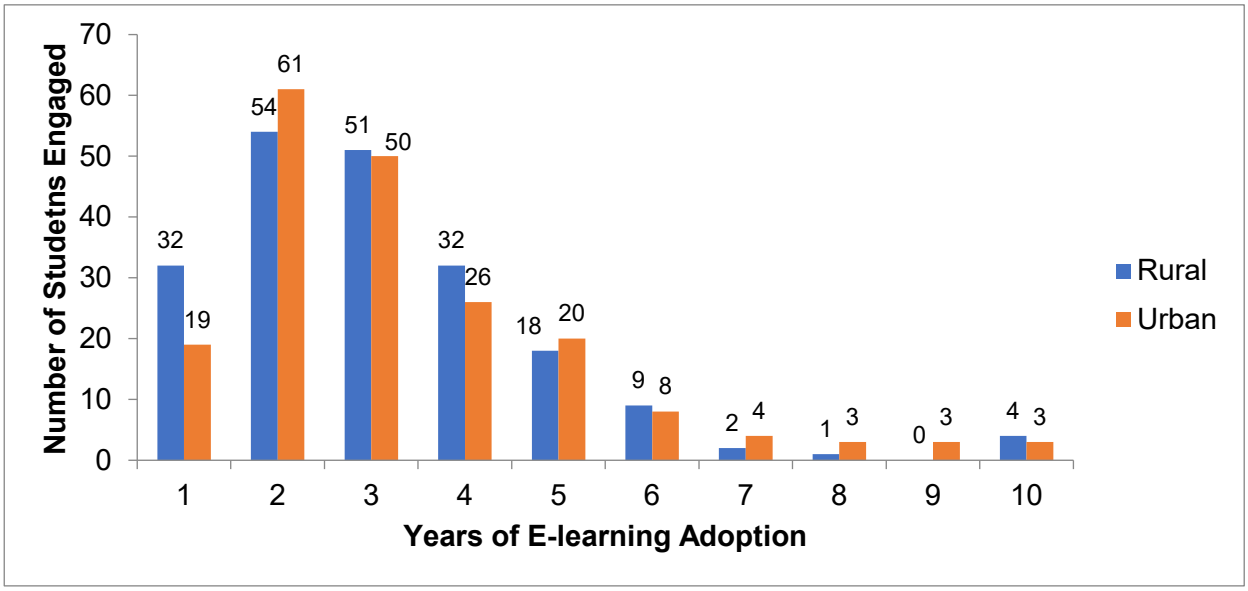

Figure 1 illustrates trends in e-learning adoption among urban and rural students over a ten-year period. Both groups show a similar pattern: adoption increased to a peak in the second year, followed by a gradual decline in subsequent years. Interestingly, rural students reported higher adoption rates than urban students in the early years (years 1-4), but urban students showed slightly higher rates in later years (years 5-10). These shifts may reflect changing access patterns, infrastructure improvements, or evolving digital preferences.

Figure 2. E-learning integration in student education (rural vs. urban).

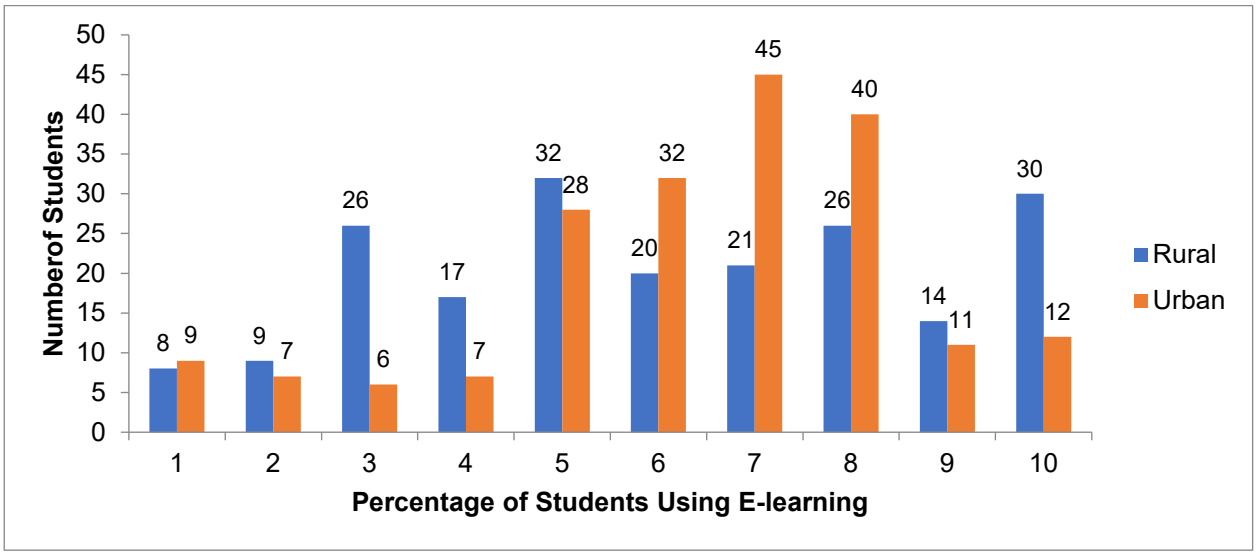

Figure 2 depicts the extent of e-learning integration, measured by the percentage of study supported by e-learning, among urban and rural students. The x-axis represents integration levels, where 1 = 10%, 2 = 20%, and so on, up to 10 = 100%. Urban students reported higher levels of integration than rural students. While both groups show fluctuating patterns over time, urban students generally reported higher levels of integration, especially in the later periods. Notably, rural students peaked in the fifth year, while urban students reached their highest levels in the seventh and eighth years. These trends suggest evolving access and engagement dynamics across localities.

Figure 3 displays trends in e-learning adoption for male and female students over ten years. Both male and female students show a peak in adoption in the second year, with males having slightly higher numbers. After the second year, adoption rates gradually declined for both groups, with a sharp drop after the fifth year. By the tenth year, fewer than ten students from each group reported adoption.

Figure 3. E-learning adoption among students (female vs. male).

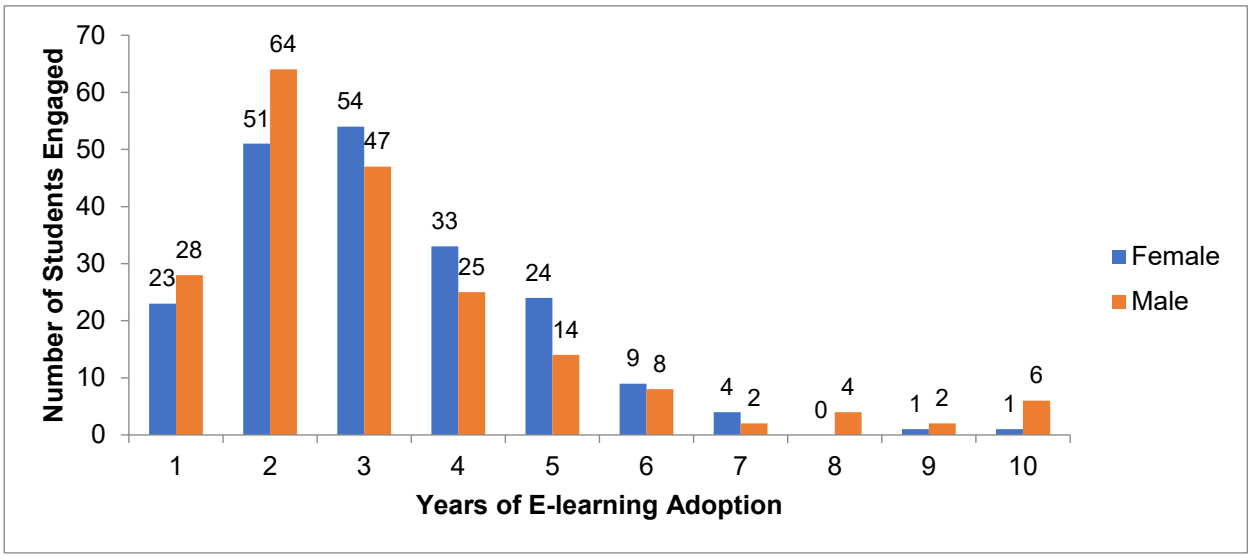

Figure 4. E-learning integration in student education (female vs. male).

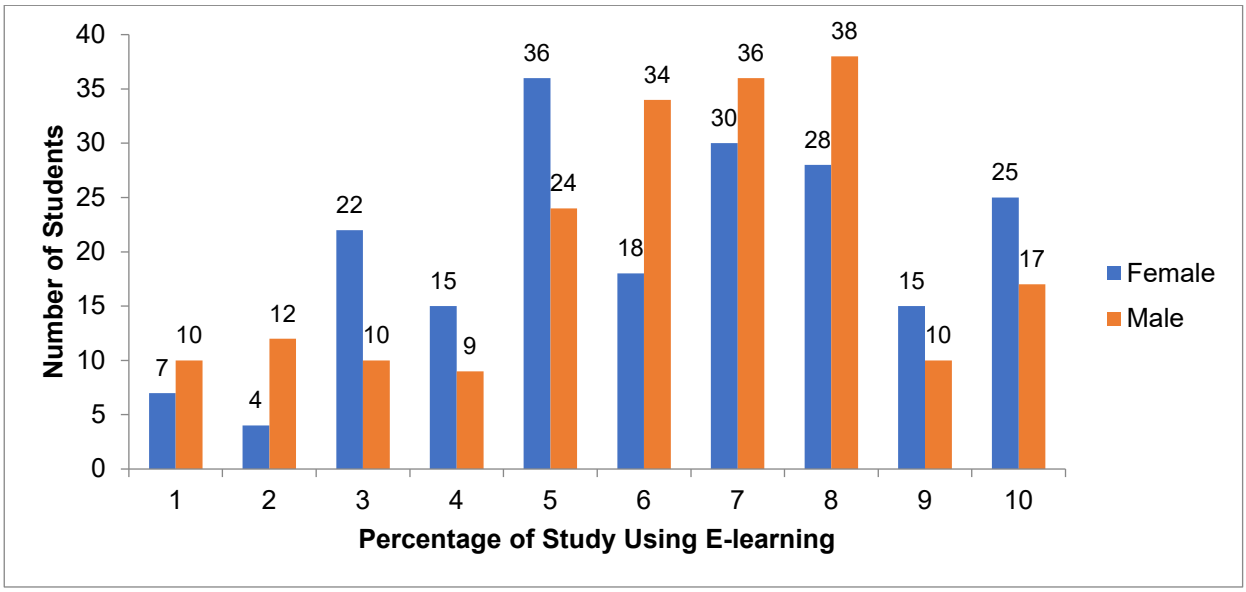

Figure 4 illustrates differences in e-learning integration between male and female students at various levels of usage. This data was collected through additional survey questions where students self-reported the approximate percentage of their total study supported by e-learning resources. At lower usage levels (10% to 50%), female students reported higher integration, peaking at 50%. Male students, however, reported higher integration at the highest usage levels (60% to 100%), indicating that they are more likely to rely on e-learning as their primary study method.

These patterns support the broader findings of this study. Rural and female students, despite initial limitations in access, demonstrate strong motivation and retention when provided with opportunities to engage in digital learning (Mariya et al., 2022; Mathrani et al., 2023). Notably,

longitudinal data from the past decade reveal a resurgence in e-learning adoption and integration in recent years, particularly among female and rural learners, suggesting growing digital confidence and sustained academic commitment. These insights underscore the need for targeted digital support and infrastructure development to foster equitable access, sustained engagement, and inclusive educational outcomes across diverse learner groups.

Data analysis

Data were analysed using SPSS software. Mean, standard deviation and independent samples t-tests were performed to compare the motivation of male and female students, and urban and rural students. Independent samples t-tests were conducted to determine if significant differences exist between male and female students and urban and rural students in their motivation towards e-learning. A significance level of 0.05 was used for all statistical tests.

Table 1. Mean differences in e-learning motivation by gender and locality.

Variable	Group	No. of students	Mean	Std. deviation	Std. error mean	t-value	p-value	Mean difference
Gender	Male	200	142.51	24.72	1.748	2.050	0.041	5.130
	Female	200	147.64	25.33	1.791			
Locality	Urban	197	142.16	24.01	1.711	2.30	0.022	5.739
	Rural	203	147.90	25.91	1.818			

Table 1 reveals that female students scored higher than males on e-learning motivation; the difference was statistically significant ($p = 0.041$, $t = 2.050$). Since the p-value is less than 0.05, the result is statistically significant. Thus, Hypothesis 1 is accepted, indicating a significant difference in e-learning motivation between male and female students. This suggests that gender significantly influences students' motivation towards e-learning.

The mean score for rural students ($M = 147.90$, $SD = 25.91$) was higher than that of urban students ($M = 142.16$, $SD = 24.01$); the difference was statistically significant ($p = 0.022$, $t = 2.30$). Therefore, Hypothesis 2 is also accepted, indicating a significant difference in e-learning motivation between urban and rural students. This suggests that locality significantly influences students' motivation towards e-learning.

Table 2. Analysis of e-learning motivation by dimensions across gender and locality.

Dimension	Group	Mean (SD)	t-value	p-value	Mean difference	Interpretation
Intrinsic goal orientation	Male	12.01 (2.77)	2.04	0.042	0.53	Significant ($p < 0.05$)
	Female	12.54 (2.40)				
	Urban	12.05 (2.43)	1.76	0.079	0.46	Not significant
	Rural	12.50 (2.74)				
Extrinsic goal orientation	Male	12.04 (2.62)	3.75	0.000	0.98	Significant ($p < 0.05$)
	Female	13.02 (2.63)				
	Urban	12.16 (2.56)	2.72	0.007	0.72	Significant ($p < 0.05$)
	Rural	12.88 (2.72)				
Control of learning beliefs	Male	12.14 (2.58)	2.45	0.015	0.64	Significant ($p < 0.05$)
	Female	12.77 (2.61)				
	Urban	12.29 (2.69)	1.20	0.230	0.31	Not significant
	Rural	12.61 (2.53)				
Self-efficacy	Male	27.32 (5.16)	1.99	0.047	1.04	Significant ($p < 0.05$)
	Female	28.36 (5.30)				

Dimension	Group	Mean (SD)	t-value	p-value	Mean difference	Interpretation
	Urban	27.20 (4.96)	2.39	0.017	1.25	Significant ($p < 0.05$)
	Rural	28.45 (5.46)				
Task value	Male	19.88 (3.70)	1.30	0.196	0.50	Not significant
	Female	20.39 (4.08)				
	Urban	19.65 (3.78)	2.46	0.014	0.95	Significant ($p < 0.05$)
	Rural	20.60 (3.96)				
Social engagement	Male	14.84 (2.47)	1.89	0.059	0.52	Not significant
	Female	15.37 (3.01)				
	Urban	14.90 (2.58)	1.48	0.140	0.41	Not significant
	Rural	15.31 (2.93)				
Instructor support	Male	23.28 (4.67)	1.07	0.286	0.52	Not significant
	Female	23.81 (5.11)				
	Urban	23.02 (4.42)	2.11	0.035	1.03	Significant ($p < 0.05$)
	Rural	24.05 (5.28)				

Table 2 shows the analysis of the dimensions of e-learning motivation. The results of this study provide important insights into the motivational factors influencing undergraduate students' motivation towards e-learning, particularly in relation to gender and locality. These findings reveal significant differences in motivation across several subscales of the MLOQ, highlighting how diverse student groups perceive and approach e-learning differently.

Intrinsic goal orientation

Female students scored significantly higher than males, suggesting that females are more motivated by the personal satisfaction of learning and understanding course content. However, the difference between rural and urban students was not statistically significant (t = 1.76, p = 0.079).

Extrinsic goal orientation

Females were more driven by external rewards than males (t = 3.75, p < .001). Similarly, rural students scored higher than urban students (t = 2.72, p = .007). The difference was statistically significant in both groups. This suggests that both groups are more influenced by factors like grades or career prospects, possibly due to a stronger focus on upward mobility.

Control of learning beliefs

Female students showed greater belief that their efforts can lead to academic success than males (t = 2.45, p = .015); this difference was statistically significant. The rural-urban comparison did not show a significant difference (t = 1.20, p = .230), although rural students scored slightly higher.

Self-efficacy

Female students reported significantly higher confidence in their learning abilities than males (t = 1.99, p = .047). Rural students also showed significantly higher self-efficacy than urban students (t = 2.39, p = .017).

Task value

No significant gender difference was found between male and female students (t = 1.30, p = .196) in task value, though females had slightly higher mean scores. However, rural students

scored significantly higher than urban students (t = 2.46, p = .014), indicating that rural students perceive online tasks as more relevant and useful.

Social engagement

There were no significant differences between male and female students (t = 1.89, p = .059), nor between rural and urban students (t = 1.48, p = .140). This shows that students across groups experienced similar levels of interaction and peer engagement.

Instructor support

With regard to gender, significant differences were not found, although females had slightly higher scores (t = 1.07, p = .286). Rural students reported significantly higher levels of instructor support than urban students (t = 2.11, p = .035). This finding reflects the importance of teacher support for rural students.

Discussion

This study examined undergraduate students' motivation toward e-learning through seven key dimensions: intrinsic goal orientation, extrinsic goal orientation, control of learning beliefs, self-efficacy, task value, social engagement, and instructor support. The findings revealed significant variations in motivation based on gender and locality, highlighting how these shape students' engagement with digital learning. The following discussion explores these differences.

Intrinsic goal orientation

Intrinsic goal orientation refers to learning driven by internal motivations, such as personal interest, enjoyment, or a desire to master content (Ryan & Deci, 2000). Female students scored significantly higher than male students. Although rural students scored higher than urban students, the difference was not statistically significant. Findings related to these dimensions suggest that female students are more likely to find personal satisfaction and meaning in their learning, consistent with meta-analytic evidence showing small gender differences in e-learners' satisfaction and motivation (Yu & Deng, 2022). Moreover, rural–urban disparities in digital outcomes may reflect differences in access to capital and infrastructure rather than learner engagement alone (Zhao et al., 2022). Such intrinsic

motivations are known to support deeper conceptual understanding and long-term retention (Artino, 2008). The slightly higher scores among rural students may reflect a heightened appreciation for limited educational opportunities, though this needs further investigation.

Extrinsic goal orientation

Extrinsic goal orientation involves motivation driven by external rewards such as grades, certifications, or job prospects (Deci & Ryan, 1985). Females and rural students scored significantly higher than males and urban students in this dimension. This indicates that both females and rural students are more driven by outcomes tied to educational success, likely due to perceived socio-economic benefits. For rural learners, who often face barriers to traditional education, e-learning is viewed as a path to upward mobility (Zhao et al., 2022). Research shows that extrinsically motivated learners are often more persistent and outcome-focused, contributing to consistent academic effort and goal-directed behaviour (Yu & Deng, 2022).

Control of learning beliefs

This dimension reflects a learner's belief that their academic success depends on their own effort and strategies rather than external factors (Fowler, 2018). Female students showed significantly stronger control beliefs than males. Differences between rural and urban students were not significant. Students with strong control beliefs are more likely to take ownership of their learning, engage in self-monitoring, and adjust their study strategies accordingly. This enhances self-regulation and academic responsibility (Zimmerman, 2000). The finding aligns with Yu and Deng (2022), who found that female e-learners often demonstrate higher satisfaction and motivation, suggesting stronger accountability when supported through digital platforms.

Self-efficacy

Self-efficacy is the confidence learners have in their ability to complete tasks and achieve academic goals (Ryan & Deci, 2000). Both female and rural students showed significantly higher self-efficacy, which is a well-established predictor of academic success in e-learning, as it fosters resilience, initiative, and adaptive learning behaviours (Yu & Deng, 2022). Rural students' elevated scores may be attributed to their experience in overcoming infrastructural

limitations, which strengthens their problem-solving confidence (Tewari & Tewari, 2025). Female students may gain self-efficacy through structured digital support and successful navigation of online platforms (Mensah et al., 2024).

Task value

Task value refers to students' perception of how useful, important, or interesting a learning task is (Artino, 2008). While no significant gender difference was found, rural students reported significantly higher task value. When students perceive high task value, they are more likely to invest effort, sustain attention, and persist through difficulties (Dichev & Dicheva, 2017). Rural students' recognition of e-learning as a unique and valuable opportunity supports their motivation to engage more deeply, in line with Tewari and Tewari (2025), who emphasise the transformative potential of digital education in rural contexts.

Social engagement

Social engagement involves interactions with peers, participation in discussions, and feelings of connectedness in the learning environment (Kew et al., 2018). No statistically significant differences were found by gender or locality. This suggests that peer interaction in e-learning is similarly experienced across groups, though the overall moderate scores may indicate room for improvement in collaborative features. Enhancing peer connections through forums or group projects could benefit all learners (Rockinson-Szapkiw et al., 2022).

Instructor support

Instructor support includes timely feedback, encouragement, and guidance provided by teachers during e-learning. While gender differences were not significant, rural students reported receiving significantly more instructor support. Effective instructor support can increase students' academic confidence, improve comprehension, and reduce anxiety, particularly in isolated or resource-scarce environments (Richardson & Lowenthal, 2017). In rural settings, where students may have limited access to peer networks or self-help resources, instructor presence plays a vital role in maintaining motivation and reducing dropout risk (Vanitha & Alathur, 2021).

The overall findings suggest that female students in Haryana are more motivated to use e-learning than male students, especially in areas such as intrinsic goal orientation, extrinsic

goal orientation, control of learning beliefs and self-efficacy. Rural students also showed higher motivation in areas like extrinsic goal orientation, self-efficacy, task value and instructor support, despite facing technological challenges. These results emphasise that e-learning strategies must be tailored to students' unique backgrounds. In sum, gender and location significantly shape students' e-learning motivation. Understanding and responding to these differences is the key to building a more inclusive and effective digital education system.

Practical implications

1. **Equitable access to e-resources:** In rural areas, students are highly motivated to learn online, but they have limited access to digital devices. Policymakers and educational institutions should focus on improving internet connectivity in rural areas. They should provide digital devices at reasonable prices. This will improve students' motivation and also reduce the e-learning gap between urban and rural areas.
2. **Support for female students:** In this study, female students were found to be more motivated than male students. The findings emphasise that it is important to provide targeted institutional support for female students to ensure their sustained engagement in e-learning. There should be a focus on providing mentorship, career guidance, and digital literacy programs to the female students according to their specific needs and aspirations.
3. **User-friendly e-learning platforms:** The e-learning platforms should have simplified interfaces to maintain student motivation, especially in rural areas. They should also provide offline access to learning materials. This will help students, especially those with limited technological skills, to engage more efficiently with e-resources.
4. **Support from instructors:** According to the study, students with instructor support showed greater levels of motivation. So, educational institutions need to train teachers in effective online teaching and the provision of personalised feedback. Building strong relationships between students and instructors in online learning environments will enhance students' learning experience and motivation.
5. **Intrinsic and extrinsic factors:** These factors greatly affect students' engagement in e-learning. Educational institutions should plan their curriculum by offering opportunities for personal growth, satisfaction, and achievement such that it addresses both types of motivation.

6. **Personalised learning paths:** When students feel that the content is designed as per their individual needs, they are more likely to engage with the material. Personalised learning paths can enhance students' motivation towards e-learning.
7. **Clear learning objectives and outcomes:** At the beginning of each course, setting learning objectives and outcomes helps students to understand what is expected of them. This reduces anxiety and confusion, which can negatively influence their motivation levels.
8. **Gamification:** In education, this means including game-like elements, such as points, badges, and leader boards, in the learning process. This makes e-learning more enjoyable and competitive, and significantly increases students' motivation.
9. **Encouraging self-regulation:** Self-regulation strategies, such as time management, goal setting, and self-assessment, can enhance students' motivation towards e-learning. Self-regulated learners are more likely to take responsibility for their learning and face the challenges.
10. **Positive online learning environment:** This can significantly improve students' motivation towards e-learning. Teachers should develop a positive atmosphere by encouraging open communication, providing emotional support, and recognising students' efforts.

By addressing these factors, educational stakeholders can better support the diverse needs of learners globally. This will ensure that e-learning serves as a transformative tool for enhancing access to education and improving students' motivation and engagement.

Conclusion

This study explored the motivational factors influencing e-learning among undergraduate students in Haryana, with a focus on gender and locality differences. The findings indicate that female students generally report higher levels of intrinsic and extrinsic motivation, as well as greater self-efficacy and control of learning beliefs, as compared to their male counterparts. Similarly, rural students displayed higher motivation levels than urban students on several dimensions, suggesting that e-learning can serve as an essential tool for overcoming educational challenges in resource-limited settings.

These results underscore the critical role of tailored digital education initiatives. For female students, the strong motivation observed suggests that targeted support—such as mentorship, career guidance, and digital literacy programs can further enhance their educational outcomes. For rural learners, improving access to digital resources and robust instructor support is the key to sustaining engagement and narrowing the urban–rural divide.

The study contributes to the broader discourse on digital equity by highlighting that effective e-learning environments depend not only on technology but also on addressing the diverse motivational needs of students. Educational stakeholders must prioritise both the development of user-friendly digital platforms and the implementation of supportive interventions to foster an inclusive online learning ecosystem.

Future research could consider longitudinal designs to track changes in motivation over time and employ mixed-method approaches to gain deeper insight into the experiences of diverse learner groups.

Disclosure statement

The authors used the following generative AI tools in the preparation of this manuscript: ChatGPT (OpenAI). The tasks performed by this tool were limited to enhancing the language, fluency, and clarity of the manuscript text. All intellectual content, research design, data analysis, interpretation of results, and theoretical framing remain the sole work of the human authors. The authors have complied with the JLDHE's principles of AI use.

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