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A STUDY ON E-LEARNING ADOPTION AND EFFECTIVENESS IN TRAINING PROGRAMS FOR TEACHERS IN HIGHER EDUCATION

Saidalavi K.[i]
Assistant Professor,
Department of Management & Commerce,
Maulana Azad National Urdu University (MANUU),
Hyderabad, India

Abstract:
E-learning, supported by innovative technologies, is vital to modern education and workforce development. This study examines the adoption and effectiveness of e-learning in training programs. This study investigates the impact of demographic characteristics on e-learning adoption, explores the impact of e-learning adoption on e-learning effectiveness and provides insightful information for enhancing e-learning programmes. The study uses an exploratory design, collecting data from 800 teachers of higher educational institutions who enrolled in multiple online training programmes. Primary data was collected using a structured questionnaire. The hypotheses were tested using MANOVA and multiple regression analysis. This study observed that select demographic variables significantly influence e-learning adoption, and adoption is significantly associated with learning effectiveness. This study provides practical insights for effectively implementing e-learning strategies and ensuring the efficiency of learning programs.

Keywords: e-learning adoption, learning effectiveness, online training, higher education

1. Introduction

E-learning has become crucial to meet the demand for quick adaptation and practical training. The effective and convenient delivery of education is made possible by e-learning, which uses cutting-edge information and communication technology. According to the E-Learning Market Trends and Forecast Report 2014, the e-learning market would experience rapid expansion. A compound annual growth rate of 7.6% is predicted for the global self-paced e-learning industry, which is expected to reach $151.5 billion by 2025. The most significant rise was seen in Asia, highlighting the attraction of e-learning on a worldwide scale. The e-learning market in India has grown remarkably, driven by factors such as low costs, compelling content, government assistance,

[i] Correspondence: email saidalavi@manuu.edu.in

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expanding tablet usage, and widespread technological acceptance. India is a popular location for outsourcing e-learning content creation because of the country's wealth of technology and multimedia expertise, as well as its cost advantages.

Today's training is facilitated by many technical resources, including self-created films, online communication platforms, virtual learning environments, and massive open online courses (MOOCs). These resources have accelerated technology acceptance in training, reducing the need for conventional instructor-led training sessions. The adoption and efficiency of learning in the current educational environment are critical factors in determining how well learners experience the training programmes. This research explores the interrelationship between e-learning adoption and efficiency.

2. Literature Review

2.1 E-Learning Adoption and Effectiveness

According to Alshehri, A., Rutter, M., & Smith, S. (2019), e-learning has become vital to organizational learning and development. This literature review examines models and elements that affect the adoption and efficacy of e-learning while filling in research gaps in three key areas: relevant studies, e-learning influencers, and technology acceptance models. The psychological variables that drive the adoption of e-learning are revealed through technology acceptance models, which are the cornerstones of understanding technology adoption. Essential factors include users' attitudes, social influences, perceived control, utility, and convenience (Davis, 1986; Fishbein & Ajzen, 1975; Ajzen, 1985).

2.2 Evolution of Research Models in E-Learning Adoption

Understanding users' attitudes towards technology is pivotal for understanding e-learning adoption and effectiveness. Theory of Reasoned Action explains that "*attitude towards that behaviour as well as by subjective norms influence the intention to engage in an activity*" (Fishbein and Ajzen, 1975). According to TRA, users' attitudes and the social pressure they feel from key referents can significantly impact their desire to use e-learning in the context of that medium. "*The Theory of Planned Behaviour, which builds on TRA, adds perceived behavioural control as another element influencing behavioural intention*" (Ajzen, 1985). This suggests that users' perceptions of their level of control over adopting e-learning play a crucial role in adopting e-learning. The Technology Acceptance Model (TAM) explains user acceptance of computers based on perceived usefulness and simplicity of use (Davis, 1989). Users' opinions of how beneficial and simple e-learning systems are having a considerable impact on their adoption choices in e-learning. These models offer insightful information on how the psychological elements influence e-learning adoption. They emphasize that a person's views, social influences, perception of control, usefulness, and convenience are crucial in determining whether they will adopt e-learning technology.

2.3 E-Learning Adoption and Effectiveness

2.3.1 Perceived Ease of Use and Usefulness

Fundamental elements affecting the adoption of e-learning include perceived utility and simplicity of use, as identified in TAM. Users adopt e-learning technologies if they recognize them as simple and valuable tools for attaining their objectives.

2.3.2 Social Cognitive Theory

The Social Cognitive Theory introduces concepts like self-efficacy, result expectations, and the impact on understanding technology adoption. Individuals' perceptions regarding the effects of employing technology are called outcome expectations. Self-efficacy refers to users' belief in their capacity to use e-learning successfully. Emotional responses that users have to e-learning technology are referred to as affect. These psychological aspects influence users' decisions to adopt e-learning.

2.3.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

"*UTAUT merges different theories of technology acceptance and incorporates dimensions like performance expectancy, effort expectancy, and social influence to predict technology adoption*" (Venkatesh et al., 2003). Users' expectations of the advantages they will receive from e-learning are related to performance expectancy. Users' judgements of how simple it is to use e-learning are reflected in their effort expectancy. Social influence examines how outside variables like peers or superiors impact users' adoption decisions. Beyond individual beliefs and attitudes, UTAUT offers a thorough framework for comprehending technology adoption.

2.3.4 Demographic Variables and Adoption of e-learning

Researchers have observed that users' characteristics, such as age (Berkowsky, et al., 2017), educational background (Tarhini, A., et al., 2016), and past technology experience (Boateng, et al., 2016) have a significant impact on how they adopt e-learning. Rojas-Mendez, et al. (2017) observed that gender has no significant impact on technology adoption. The engagement, involvement, and, ultimately, the results of users' e-learning experiences are all strongly impacted by learner motivation and attitude (Deci et al., 1991; Rovai, 2002). Learning motivation is a crucial factor influencing involvement in training activities, including online learning (Ryan & Deci, 2000). Active participation in e-learning courses is closely correlated with intrinsic motivation, characterized by individual interest and the inherently satisfying nature of learning (Deci et al., 1991). On the other hand, those with extrinsic motives may need outside rewards or incentives to engage in e-learning successfully (Vallerand & Blssonnette, 1992). Therefore, improving the outcomes of e-learning requires identifying and nurturing student motivation.

According to Tracey et al. (1995), learners' attitudes towards online training significantly impact their learning outcomes. Positive attitudes are consistently associated with more engagement, better memory retention, and excellent practical application of newly acquired skills in work-related tasks (Sitzmann & Ely, 2011). These

positive attitudes are influenced by several variables, including the perceived relevance of the training material to the learners' particular jobs within the organization (Noe et al., 2010). Furthermore, according to Means et al. (2010), the effectiveness of instructional design—which includes pedagogical strategies and interactive components—considerably influences learners' views towards e-learning as well as their overall level of satisfaction. Additionally, e-learning platforms' broader learning experiences, including accessibility and navigation simplicity, significantly impact how learners perceive their learning (Dixson, 2010).

Technology improvements have significantly changed e-learning. With a wide range of characteristics and advantages to improve the learning process, several technologies have been developed as effective instruments to support electronic-enabled training. The key e-learning technologies include video conferencing, digital collaboration tools, virtual classrooms, chat rooms, webinars, intelligent classrooms, weblogs (blogs), web conferencing, podcasting, mobile learning (M-Learning), social networking, simulations, and Web 2.0 (The Participative Web).

3. Research Gap

The literature review highlighted critical research gaps that guide this study's objectives. While earlier studies acknowledged the influence of demographic characteristics (e.g., age, gender, education, and technological experience) on e-learning, more context-specific investigations are required. Existing research frequently reveals broad tendencies, which need in-depth investigation within particular contexts such as online training programmes. Established models like TAM and UTAUT offer valuable insights into various aspects of e-learning; nevertheless, further research is required to determine how they directly impact learners in a particular situation. Researchers need to understand the complex connections between perceived utility, usability, and individual factors, including various demographic factors.

More focused recommendations will result from this research, tailored to this demographic group's specific requirements and expectations regarding professional online training programmes. While previous research has acknowledged the importance of demographic factors and different influencing variables in the adoption and effectiveness of e-learning, this study goes deeper into the demographics of faculty members from higher educational institutions, investigates particular influencing factors, and contextualizes its findings within India's professional online training programmes.

3.1 Objectives of the Study

- To explore the impact of demographics on the adoption of e-learning.
- To understand the factors that influence the adoption of e-learning.
- To examine the factors that influence the effectiveness of e-learning.
- To understand the impact of e-learning adoption on learning effectiveness.

3.2 Hypotheses

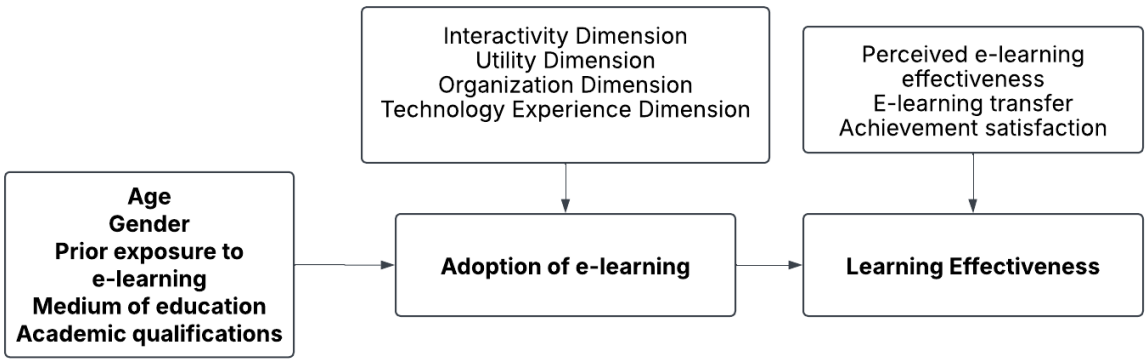
H1: There is a significant impact of age, gender, academic qualifications, prior exposure to e-learning and the medium of education of teachers from higher educational institutions on e-learning adoption

H2: There is a significant and positive impact of e-learning adoption on learning effectiveness.

4. Conceptual Framework

The conceptual framework for this study is based on an analysis of the demographic profiles of teachers of higher education and their possible impact on the adoption and efficiency of e-learning. It proposes that age, gender, prior exposure to e-learning, the medium of instruction, academic degrees, and the number of online courses taken may impact the outcomes of e-learning initiatives. These demographic parameters are considered independent variables that may influence the adoption. This study intends to identify correlations and associations between e-learning adoption and e-learning effectiveness. these variables offer important insights into the multifaceted relationship between teachers of higher education demographics and the effective adoption of e-learning in higher education. This conceptual framework serves as a basis for a comprehensive investigation of the multifaceted dynamics of e-learning acceptance and efficacy in the university setting.

Figure 1: Conceptual Framework



5. Research Methodology

The research methodology section describes the design and methods of this study for evaluating the adoption and efficiency of e-learning in training programmes in India, particularly among teachers from higher educational institutions who have participated in multiple online training programmes. This section includes a conceptual framework, study objectives, hypotheses, scope, research methodology, survey design, and sample information.

This study investigates the variables affecting the adoption and efficiency of online training programmes. Online Training Programmes are offered by government platforms

such as UGC-HRDC, SWAYAM, NPTEL, RCI (Regional Computer Centre), and AICTE Training and Learning (ATAL) Academy. This study focuses on higher education faculty members in India who have completed multiple online professional training programs. The end-user survey examines factors influencing the adoption of e-learning and the efficiency of online training programmes and provides demographic data. The data will be collected from higher education teachers. This study's sample size comprises 800 teachers from higher education institutes in India who have completed more than one online training programme.

The questionnaire includes three scales. The demographic scale collects information on academic qualifications, age, gender, prior exposure to e-learning and medium of education. The scale for measuring the adoption of e-learning includes six dimensions:

a) interactivity dimension that measures ease of use, e-learning self-efficacy, and content quality,
b) utility dimension that measures perceived usefulness, social influence and normative pressure,
c) organization dimension that measures learning culture,
d) motivation dimension that measures attitude and motivation,
e) technology experience dimension that measures prior exposure, internet experience, and
f) subjective dimension that measures computer anxiety.

The scale of measuring effectiveness of e-learning measures perceived e-learning effectiveness, e-learning transfer, and achievement satisfaction.

6. Findings

The primary data was collected from 800 faculty members from higher education institutions in India who participated in any online training programs. Among the respondents, 47% are aged between 25 and 35, 23% are between 36 and 45 years, 18% are between 46 and 55 years, 8% are above 55 years, and 4% are below 25 Years. 53% of respondents were males and 47% were females. The highest educational qualification of 32% of the respondents was a Master's Degree, 59% qualified for a PhD, and 9% had completed a Postdoctoral. 78% of the respondents had prior exposure to e-learning, while 22% had no prior experience. The preferred medium of instruction for 46% of respondents was English, while 33% preferred Hindi and 31% preferred other local languages.

The Reliability and Validity of the survey instruments were confirmed. Cronbach's Alpha was used to test internal consistency of the scales, and strong internal consistency was found as all E-Learning Adoption (0.89) and E-Learning Effectiveness (0.83) were above the threshold of 0.7. Content Validity of the measurements was established through expert review. Construct validity was confirmed using factor analysis. For all

variables, the KMO measure of sampling adequacy was above 0.80, and Bartlett's Test of Sphericity was significant ($p < 0.001$).

The impact of demographic variables on dimensions of e-learning adoption was tested using a Multivariate Analysis of Variance (MANOVA). The findings indicate that age has a significant impact on e-learning adoption dimensions (Wilks' Lambda, $p < 0.05$). Teachers aged between 25 and 35 exhibit a higher level of interactivity and motivation, which confirms higher ease of use and self-efficacy in this age group. The 36-45 age group have a higher score towards organizational and utility dimensions, indicating workplace influence on the adoption. 46-55 and above 55 have a higher score of computer anxiety, indicating a negative adoption. The findings indicate there is no significant gender difference in e-learning adoption. The level of educational qualification has a significant and positive impact on the adoption of e-learning. While Postdoctoral respondents score significantly higher in utility and organizational dimensions, PhD holders score higher in motivation and interactivity, and Master's degree holders have moderate adoption, with lower scores in technology experience. Prior exposure has a significant and positive impact across all dimensions of adoption. While English-preferred medium of instruction significantly and positively influences adoption in all dimensions, Hindi and local language users exhibited computer anxiety and lower scores in interactivity, suggesting language barriers in technology adoption.

Table 1: MANOVA Results, Impact of Demographics on E-Learning Adoption

Variable	Wilks' Lambda	F-Statistic	p-Value	Significant Dimensions
Age	0.87	4.21	0.002	Interactivity, Motivation, Computer Anxiety
Gender	0.91	3.35	0.012	Technology Experience, Motivation
Education Level	0.88	3.89	0.005	Utility, Organizational, Motivation
Prior Exposure	0.79	5.12	0.001	All dimensions
Preferred Language	0.85	4.21	0.002	Interactivity, Motivation, Computer Anxiety
Dependent Variables: Interactivity, Utility, Organizational, Motivation, Technology Experience, Computer Anxiety. Significance = $p < 0.05$				

The impact of E-Learning Adoption on Effectiveness was tested using Multiple Regression Analysis. The results indicate the significant impact of E-Learning Adoption on learning effectiveness (Adjusted $R^2 = 0.66$, ($p < 0.001$, F-statistic = 45.7).

The interactivity, utility, organization, technology experience and motivation dimensions were found to have the strongest positive effects on e-learning effectiveness. Computer anxiety had a significant negative impact on learning effectiveness, indicating that a higher computer anxiety level of teachers reduces e-learning effectiveness.

Predictor	Beta Coefficient	t-value	p-value
Interactivity Dimension	0.33	6.7	0.000
Utility Dimension	0.26	5.3	0.000
Organization Dimension	0.19	4.8	0.001
Motivation Dimension	0.27	6.4	0.000
Technology Experience Dimension	0.20	3.7	0.002
Subjective Dimension (Computer Anxiety)	-0.12	-2.7	0.081

7. Discussion

This study explored the impact of select demographic variables on e-learning adoption and the impact of e-learning adoption on learning effectiveness. The findings assert the significant role of demographics in e-learning adoption and the significant impact of e-learning adoption on learning effectiveness. This study observes that age, educational qualification, prior exposure, and language preference have a significant positive impact on e-learning adoption, while gender has no significant impact. This study also submits that most of the dimensions of e-learning adoption, such as interactivity, utility, organization, motivation, and technology experience, have a significant impact on e-learning effectiveness.

7.1 Impact of Demographics on E-learning Adoption

This study observes that age has a significant impact on e-learning adoption, indicating that different age groups have varied levels of interaction with e-learning platforms. The highest level of interactivity and motivation was exhibited by the teachers aged 25-35, indicating greater ease of use and self-efficacy, aligning with previous research highlighting young professionals' propensity toward technology adoption. The highest level of organizational and utility dimensions was exhibited by the teachers aged 36-45, indicating that workplace norms and institutional policies play a crucial role in driving e-learning adoption.

This study also observed that a higher level of computer anxiety was revealed by teachers aged above 45, which negatively influenced e-learning adoption. This study noted that there is no significant difference between males and females in their e-learning adoption. These observations challenge the traditional assumptions about gender disparities in technology adoption.

This study reports that the level of education significantly influences e-learning adoption. Postdoctoral respondents scored higher in utility and organizational dimensions, indicating that teachers with a higher level of qualifications approach e-learning as a tool for professional growth and institutional engagement. Ph.D. holders exhibited higher motivation and interactivity, indicating a higher level of motivation for utilizing digital learning tools.

This study also notes that master's degree holders exhibited lower scores in technology experience and e-learning adoption, indicating the need for tailored training

programs for early career teachers with less exposure to learning platforms, to enhance their digital competencies and encourage greater adoption.

This study highlights the significant influence of prior exposure on e-learning adoption. The findings of this study demonstrate that the language preference significantly influences e-learning adoption. Teachers who preferred English as a medium of instruction exhibited higher adoption levels across all dimensions of e-learning adoption. In contrast, Hindi and local language users exhibited challenges in adoption, scoring higher on computer anxiety and lower interactivity.

7.2 Impact of E-Learning Adoption on Learning Effectiveness

This study reveals that e-learning adoption significantly influences learning effectiveness, while among the dimensions of adoption, interactivity, utility, organizational, motivation, and technology experience dimensions have a positive impact on learning effectiveness, computer anxiety exerts a negative influence. This study observes that interactivity is the strongest predictor of effectiveness, indicating that user satisfaction and knowledge retention are enhanced by engagement-driven e-learning environments enhance. Utility also has a higher level of impact on effectiveness, indicating that integration of e-learning into teaching methodology is highly influenced by the perception of being beneficial and resourceful. Organizational Dimension also significantly influences e-learning adoption. This emphasizes that administrative support and institutional encouragement enhance learning outcomes. This study also submits that technology Experience significantly influences e-learning adoption, indicating that technology experience enhances user confidence and effectiveness in e-learning settings. This study notes that computer anxiety has a significant negative impact on e-learning adoption. Lack of user-friendly platforms and lack of confidence affect the adoption. This study emphasises the need for digital literacy initiatives to enhance confidence and ease of use feeling among educators.

8. Implications of the Study

This study offers valuable insights and implications for both academicians, policy makers and practitioners. The findings of the study provide actionable insights for academic and training institutions to design e-learning strategies based on demographic insights. Age-appropriate and suitable learning strategies, which are customized for different age groups, may enhance the positive perception towards e-learning, and it will increase the learning experiences, such as offering e-learning programs embedded with interactivity and motivation for younger learners, and structured e-learning modules that align with institutional goals for older learners. This study contributes implications for designing training programs focusing on digital literacy, hands-on workshops, and technical support to mitigate the learners' reluctance and enhance their adoption rates. This study highlights key takeaways regarding the need for ensuring exposure of teachers to e-

learning programs by integrating digital readiness programs into faculty development initiatives.

This study offers practical recommendations for overcoming the challenge of language barriers in adopting e-learning tools, as non-English language users exhibit lower interactivity and higher computer anxiety, developing multilingual e-learning platforms, localized instructional materials, and language-adaptive user interfaces to enhance accessibility and inclusivity.

This study highlights the role of age, education level, prior exposure, and language preference in influencing adoption. This study also provides empirical evidence on how e-learning adoption influences learning effectiveness, highlighting that the dimensions of adoption, such as interactivity, motivation, utility, organizational structure, and technology experience, significantly enhance learning effectiveness.

9. Conclusion

This research proposal explores the crucial area of e-learning adoption and effectiveness among teachers in higher education. The holistic approach of the study, which is based on thorough literature reviews and a well-structured research methodology, strives to clarify the complex interactions of demographic factors on the adoption and effectiveness of e-learning. This study aims to offer essential insights into the dynamics of e-learning adoption within the higher education context in India by assessing age, gender, prior exposure, academic background, and course participation. This research aims to provide specific recommendations for improving e-learning experiences for this critical group of educators in light of the expanding significance of online training programmes. This study has the potential to offer specific suggestions for improving instructors' e-learning experiences in higher education, adding significant knowledge to the field of educational technology and promoting the successful implementation of online training courses.

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Conflict of Interest Statement
The authors declare no conflicts of interest.

About the Author(s)
Dr. Saidalavi K. is an Assistant Professor at the Department of Management Studies, Maulana Azad National Urdu University (MANUU), Hyderabad, with over a decade of experience in teaching and academic administration. He holds a PhD in Management Studies, with research focusing on authentic leadership and sales performance in foreign banks in India, and has also completed an MPhil and MBA in Management. His research

interests include cultural intelligence, e-servicescape aesthetics, and online consumer behavior, with numerous publications in national and international journals.

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