

Effect of Constructivism-Based e-learning on Bank of Baroda Employees

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INDEX

SR. NO.	TOPIC	PAGE NO.
1	ABSTRACT	3
2	INTRODUCTION	4
3	LITERATURE REVIEW	6
4	RESEARCH GAP	10
5	OBJECTIVES	11
6	CONCEPTUAL FRAMEWORK	12
7	HYPOTHESES	14
8	RESEARCH METHODOLOGY	19
9	DATA ANALYSIS PLAN	21
10	ORIGINAL CONTRIBUTION OF THE STUDY	22
11	MAJOR FINDINGS OF THE STUDY	23
12	ACHIEVEMENT OF OBJECTIVES AND CONCLUSION	25
13	REFERENCES	26

1. ABSTRACT

The increasing adoption of digital learning technologies has transformed employee learning and development across knowledge-intensive organizations, particularly within the banking sector, where rapid technological advancements, evolving regulatory requirements, and increasing operational complexity necessitate continuous professional development. Constructivism-based e-learning, which emphasizes active participation, experiential learning, contextual understanding, and knowledge construction, has emerged as an effective learner-centred approach for workplace learning. Despite its growing implementation, empirical evidence regarding its effectiveness within the Indian public sector banking sector remains limited. Therefore, the present study examined the effect of constructivism-based e-learning on employees of Bank of Baroda.

The study examined the influence of learner-related factors, namely self-efficacy, professional factors, personal factors, motivation to learn, and employee engagement, along with system-related factors comprising content design and interface design, on employees' continuous intention to use, user satisfaction, and perceived net benefits derived from constructivism-based e-learning. The study also examined the moderating influence of selected demographic variables on these relationships.

The research adopted a quantitative, descriptive, and cross-sectional research design. Primary data were collected through a structured questionnaire administered to employees who had successfully completed selected constructivism-based e-learning modules through Bank of Baroda's Learning Management System, Baroda Gurukul. A total of 399 valid responses were obtained using stratified random sampling. The collected data were analysed using reliability analysis, descriptive statistics, Spearman's rank correlation, multiple regression analysis, Mann–Whitney U test, Kruskal–Wallis H test, and interaction analysis.

The findings revealed that the effectiveness of constructivism-based e-learning is influenced by a combination of learner-related and system-related factors. Motivation to learn emerged as the strongest predictor of continuous intention to use, followed by personal factors, employee engagement, and self-efficacy. Employee engagement was identified as the strongest determinant of user satisfaction, while content design, personal factors, interface design, and self-efficacy also demonstrated significant positive influence. Personal factors emerged as the strongest predictor of perceived net benefit, followed by professional factors, employee

engagement, motivation to learn, and interface design. Moderation analysis further revealed that experience and Branch location category significantly influenced several relationships between constructivism-based e-learning factors and learning outcomes.

The study establishes that constructivism-based e-learning is an effective approach for enhancing employee learning and development within Bank of Baroda. It contributes to the existing literature by extending the application of constructivist learning theory to workplace learning in the Indian banking sector and provides an integrated framework for understanding e-learning effectiveness. The findings offer practical implications for learning and development professionals, instructional designers, and organizational decision-makers in designing learner-centred, contextually relevant, and engagement-driven e-learning programmes that promote continuous learning, improve employee satisfaction, and strengthen organizational capability development.

2. INTRODUCTION

The emergence of the knowledge economy has fundamentally transformed the manner in which organizations create, manage, and sustain competitive advantage. In such environments, knowledge has emerged as a critical organizational resource, and employee competence has become an important determinant of organizational effectiveness. Consequently, learning and development has assumed strategic importance within contemporary organizations as a means of enhancing employee capabilities, supporting organizational adaptability, and sustaining long-term competitiveness. The increasing complexity of modern workplaces has further shifted organizational focus from providing job-specific knowledge to creating learning environments that facilitate continuous professional development, problem-solving capabilities, innovation, knowledge sharing, and workplace application of learning.

Among various industries, the banking sector represents one of the sectors where continuous learning has become particularly important. Banking institutions operate in an environment characterized by regulatory reforms, technological innovation, changing customer expectations, increasing competition, digital banking, financial technologies, artificial intelligence, cybersecurity, and evolving risk management requirements. These developments require banking professionals to continuously update their knowledge, skills, and competencies to perform effectively and adapt to changing organizational requirements. While classroom-based learning continues to play an important role, the need to provide timely, standardized,

and continuous learning opportunities has encouraged banks to adopt technology-enabled approaches to employee development.

Advances in information and communication technologies have significantly influenced the manner in which learning is designed, delivered, and accessed. The emergence of **e-learning** has enabled organizations to provide learning opportunities beyond conventional classroom environments and support employee development through digital platforms. Contemporary **e-learning** systems facilitate flexible access to learning resources, support continuous professional development, and enable organizations to deliver learning interventions to geographically dispersed workforces in a cost-effective and scalable manner. More importantly, the effectiveness of digital learning is no longer viewed solely in terms of technological infrastructure or content availability. Increasing attention is being given to learner engagement, participation, contextual understanding, knowledge application, collaboration, and continuous learning, leading organizations to adopt learner-centred approaches that emphasize active involvement in the learning process.

Among the theoretical perspectives influencing contemporary learning environments, constructivism has received considerable attention because of its emphasis on active learning, experiential understanding, collaboration, reflection, and practical application of knowledge. Constructivist principles have increasingly been incorporated into digital learning environments through scenario-based learning, simulations, case-based learning, interactive assessments, gamification, collaborative learning activities, and self-directed learning pathways. Such approaches facilitate knowledge construction through engagement and experience rather than passive information transmission. The relevance of constructivism-based **e-learning** is particularly evident in the banking sector, where employees are required not only to acquire information but also to interpret regulations, assess risks, utilize technology platforms, manage customer relationships, and apply knowledge in diverse operational situations.

Bank of Baroda has consistently emphasized employee learning and development as an important component of organizational growth and transformation. As part of its learning ecosystem, the Bank implemented **Baroda Gurukul**, a digital learning platform designed to support continuous learning and professional development across its geographically dispersed workforce. The increasing integration of constructivist learning principles and digital learning technologies within organizational learning environments has created a need to understand the

effectiveness of constructivism-based **e-learning** in supporting employee development. Given the strategic importance of learning within contemporary banking organizations and the growing reliance on technology-enabled learning systems, examining the effectiveness of constructivism-based **e-learning** assumes both academic and practical significance. Accordingly, this study examines the effect of constructivism-based **e-learning** on employees of Bank of Baroda and contributes to a deeper understanding of technology-enabled learning within organizational contexts.

3. LITERATURE REVIEW

Constructivist Learning Theory as a Foundation for e-learning

Constructivism provides the theoretical foundation for understanding how individuals actively construct knowledge through experience, interaction, and reflection rather than passively receiving information. The theory views learning as an active process in which learners develop understanding by integrating new experiences with their existing knowledge and beliefs. Learning therefore involves interpretation, reflection, and continuous modification of existing cognitive structures rather than simple transmission of information.

The evolution of constructivist thought has been shaped by the contributions of several scholars. Dewey (1938) emphasized the role of experience and reflective inquiry in learning, Piaget (1952) explained learning through cognitive adaptation processes such as assimilation and accommodation, Bruner (1966) highlighted discovery learning and active participation, while Vygotsky (1978) emphasized the importance of social interaction and cultural context in knowledge construction. Collectively, these contributions expanded constructivism from an experiential perspective to a comprehensive framework encompassing cognitive, social, and contextual dimensions of learning.

Constructivist learning is characterized by several core principles, including active learning, the influence of prior knowledge, contextual learning, social interaction, reflection, and learner responsibility. These principles emphasize that meaningful learning occurs when learners actively engage with authentic situations, collaborate with others, reflect upon their experiences, and apply knowledge to practical contexts. As organizations increasingly require employees to solve problems, make decisions, and adapt to changing work environments,

constructivist learning principles have gained growing relevance in organizational learning and development.

Constructivism-Based e-learning in Organizational and Workplace Contexts

The advancement of digital technologies has transformed **e-learning** from a technology-supported content delivery mechanism into a comprehensive learning environment that facilitates interaction, collaboration, knowledge sharing, self-directed learning, and continuous professional development. Contemporary **e-learning** environments emphasize learner engagement, communication, and workplace application of knowledge rather than merely providing access to learning resources. Consequently, **e-learning** is increasingly viewed as an integrated learning ecosystem capable of supporting diverse organizational learning needs.

The integration of constructivist principles with **e-learning** has led to the development of constructivism-based **e-learning**, which encourages learners to actively construct knowledge by integrating new experiences with existing understanding. Within this framework, technology functions not merely as a medium for delivering content but as an enabler of learning experiences that promote inquiry, exploration, collaboration, reflection, and problem-solving. Digital learning environments provide opportunities for learners to engage with authentic scenarios, participate in collaborative activities, receive continuous feedback, and apply acquired knowledge to practical situations.

Constructivism-based **e-learning** environments are characterized by authentic learning, learner autonomy, collaboration, reflection, and workplace application of knowledge. These characteristics distinguish constructivist **e-learning** from conventional content-centred approaches by emphasizing active learner participation, experiential learning, and contextual understanding. The relevance of such learning environments has increased across organizational settings, particularly in the banking sector, where employees are required to interpret regulations, solve workplace problems, make informed decisions, and continuously update their professional competencies.

Self-Efficacy and Constructivism-Based e-learning

Self-efficacy refers to an individual's belief in his or her capability to successfully perform learning-related tasks and achieve desired outcomes. Within constructivism-based **e-learning**

environments, self-efficacy plays a significant role in influencing learners' confidence, willingness to participate, persistence, and ability to effectively utilize digital learning systems. Learners possessing higher levels of self-efficacy are more likely to actively engage with learning activities, overcome challenges, and successfully apply acquired knowledge in workplace situations.

Previous studies have consistently reported that self-efficacy positively influences learner engagement, satisfaction, technology acceptance, and continuous use of **e-learning** systems. Constructivist learning environments that encourage exploration, problem-solving, reflection, and active participation have also been found to strengthen learners' self-efficacy by providing meaningful learning experiences and opportunities for successful task accomplishment. These findings indicate that self-efficacy constitutes an important learner-related factor influencing the effectiveness of constructivism-based **e-learning** in organizational settings.

Motivation to Learn and Learner Engagement

Motivation to learn is a key determinant of learner participation and persistence in e-learning environments. Empirical studies indicate that motivated learners demonstrate higher levels of engagement, effort, and learning transfer (Chen & Kao, 2012; Hardman & Robertson, 2012). Constructivism-based e-learning environments, by promoting autonomy and relevance, have been shown to enhance intrinsic motivation (Giannakos et al., 2021).

Learner engagement, encompassing cognitive, emotional, and behavioural dimensions, has been identified as a critical factor influencing e-learning success (Bouvier et al., 2015). Research suggests that interactive design elements, problem-based activities, and meaningful feedback contribute positively to engagement levels (Giesbers et al., 2013; Bazalais et al., 2018). In organizational settings, engagement is particularly important as employees balance learning with job responsibilities.

Professional and Personal Factors in Workplace e-learning

The literature highlights that both professional and personal factors influence the effectiveness of e-learning initiatives. Professional factors such as job relevance, organizational support, and alignment with work roles significantly affect learners' perceptions of e-learning usefulness and satisfaction (Cheng et al., 2012; Joo et al., 2011). Personal factors, including prior

experience, learning orientation, and adaptability, also shape learner engagement and outcomes (Chien, 2012).

Studies in corporate and public sector contexts indicate that when e-learning content is perceived as directly applicable to job tasks, learners exhibit higher satisfaction and intention to continue using the system (Hung & Cho, 2008; Kimiloglu et al., 2017).

Satisfaction with Content Design and Interface Design

Instructional design and system usability are critical determinants of e-learning success. Research suggests that well-structured content, clarity of learning objectives, and interactive design significantly influence learner satisfaction (Duangekanong et al., 2012; Chang et al., 2020). Interface design factors such as ease of navigation, visual clarity, and system responsiveness have also been found to affect satisfaction and continuance intention (Hong et al., 2017).

Constructivism-based e-learning systems that integrate scenario-based content and intuitive interfaces are more likely to enhance learners' perceived usefulness and satisfaction (Chien, 2012; Johnson et al., 2008).

Outcome Variables: Continuous Use, User Satisfaction, and Net Benefit

Outcome-oriented e-learning studies commonly focus on user satisfaction, continuous intention to use, and perceived net benefit. User satisfaction reflects learners' overall evaluation of their learning experience, while continuous intention to use indicates the sustainability of e-learning adoption (Esterhuyse et al., 2016; Lee, 2010). Perceived net benefit captures both individual-level outcomes, such as improved performance and confidence, and organizational-level outcomes, such as enhanced training effectiveness (Alvarez et al., 2004; Chen, 2010).

Studies in corporate and public sector organizations indicate that constructivism-based e-learning systems are more likely to produce positive net benefits when learner-centric design, motivation, and engagement are adequately addressed (Kapo et al., 2020; Giannakos et al., 2021).

Synthesis and Research Direction

The reviewed literature establishes the relevance of constructivist learning theory and highlights multiple factors influencing the effectiveness of e-learning in organizational contexts. While prior studies have examined individual constructs such as self-efficacy, motivation, engagement, and satisfaction, limited empirical research has integrated these variables into a comprehensive framework within the context of constructivism-based e-learning in Indian public sector banks. This gap provides the basis for the present study.

4. RESEARCH PROBLEM

The review of literature indicates that constructivist learning theory provides a strong theoretical foundation for designing effective learning environments, and its application in **e-learning** has been widely explored in academic and organizational contexts. Prior studies have examined the role of constructivist principles such as active learning, learner autonomy, reflection, and contextual application in enhancing learner engagement and learning outcomes. However, several research gaps remain evident, particularly in the context of constructivism-based **e-learning** implemented in the banking sector.

First, although numerous studies have investigated individual determinants of **e-learning** effectiveness—such as self-efficacy, motivation to learn, learner engagement, content design, and interface design—most of these studies have examined these constructs in isolation or within limited conceptual models. There is a lack of comprehensive empirical frameworks that integrate these constructivism-aligned variables simultaneously to explain key outcomes such as continuous intention to use, user satisfaction, and perceived net benefit in workplace **e-learning** environments.

Second, existing research on constructivism-based **e-learning** has largely focused on academic or generic corporate settings. Empirical studies examining the effectiveness of constructivism-based **e-learning** in the banking sector, particularly within Indian public sector banks, remain limited. Given the unique regulatory, operational, and functional characteristics of banking organizations, findings from academic or non-banking contexts may not be directly generalizable.

Third, while outcome variables such as user satisfaction and intention to use have been studied in prior **e-learning** research, limited attention has been given to perceived net benefit, especially from both individual and organizational perspectives. There is a need to empirically examine how constructivism-based **e-learning** contributes not only to learner satisfaction and continued usage, but also to perceived improvements in job performance, work effectiveness, and organizational value creation.

Fourth, prior studies have highlighted the influence of demographic and contextual factors on **e-learning** perceptions and outcomes; however, the moderating role of demographic variables such as age, gender, education qualification, experience, and work context has not been sufficiently examined within constructivism-based **e-learning** frameworks. In particular, interaction effects between learner characteristics and constructivism-based **e-learning** determinants remain underexplored in organizational learning research.

Finally, although organizations increasingly adopt constructivism-based **e-learning** platforms, there is limited empirical validation linking constructivist design features to sustained system usage and tangible benefits in real organizational settings. This gap underscores the need for evidence-based evaluation of constructivism-based **e-learning** systems using robust quantitative methodologies.

In light of these gaps, there is a clear need for a systematic empirical study that integrates constructivist learning principles with key **e-learning** determinants and outcome variables, and examines their interrelationships within the specific context of a public sector bank. The study addressed these gaps by proposing and empirically validating a comprehensive constructivism-based **e-learning** framework for Bank of Baroda employees.

5. OBJECTIVES

- To examine the influence of learner-related factors (self-efficacy, professional factors, personal factors, motivation to learn, and employee engagement) and system-related factors (content design and interface design) on employees' continuous intention to use constructivism based e-learning systems.
- To assess the influence of learner-related factors (self-efficacy, professional factors, personal factors, motivation to learn, and employee engagement) and system-related

factors (content design and interface design) on employees' satisfaction with constructivism based e-learning systems.

- To evaluate the influence of learner-related factors (self-efficacy, professional factors, personal factors, motivation to learn, and employee engagement) and system-related factors (content design and interface design) on the perceived net benefits derived from constructivism based e-learning systems.
- To examine the moderating influence of selected demographic variables on the relationship between constructivism based e-learning factors and e-learning effectiveness, operationalized through continuous intention to use, user satisfaction, and perceived net benefits.

6. CONCEPTUAL FRAMEWORK

The conceptual framework of the study was derived from constructivist learning theory and prior empirical research on e-learning effectiveness in organizational contexts. The framework integrates key constructivism-aligned determinants that influence employees' learning experiences and links them to critical outcome variables representing e-learning effectiveness. The framework was designed to explain how constructivism-based e-learning affects employees' continuous intention to use the system, user satisfaction, and perceived net benefit.

Constructivist learning theory emphasizes active learner involvement, contextual learning, reflection, and knowledge construction through experience (Dewey, 1938; Fosnot & Perry, 1996). When applied to e-learning, these principles translate into learner-centric instructional design, interactive learning environments, and systems that support motivation, engagement, and self-directed learning. Accordingly, the present framework positions **constructivism-based e-learning determinants** as antecedents influencing e-learning outcomes.

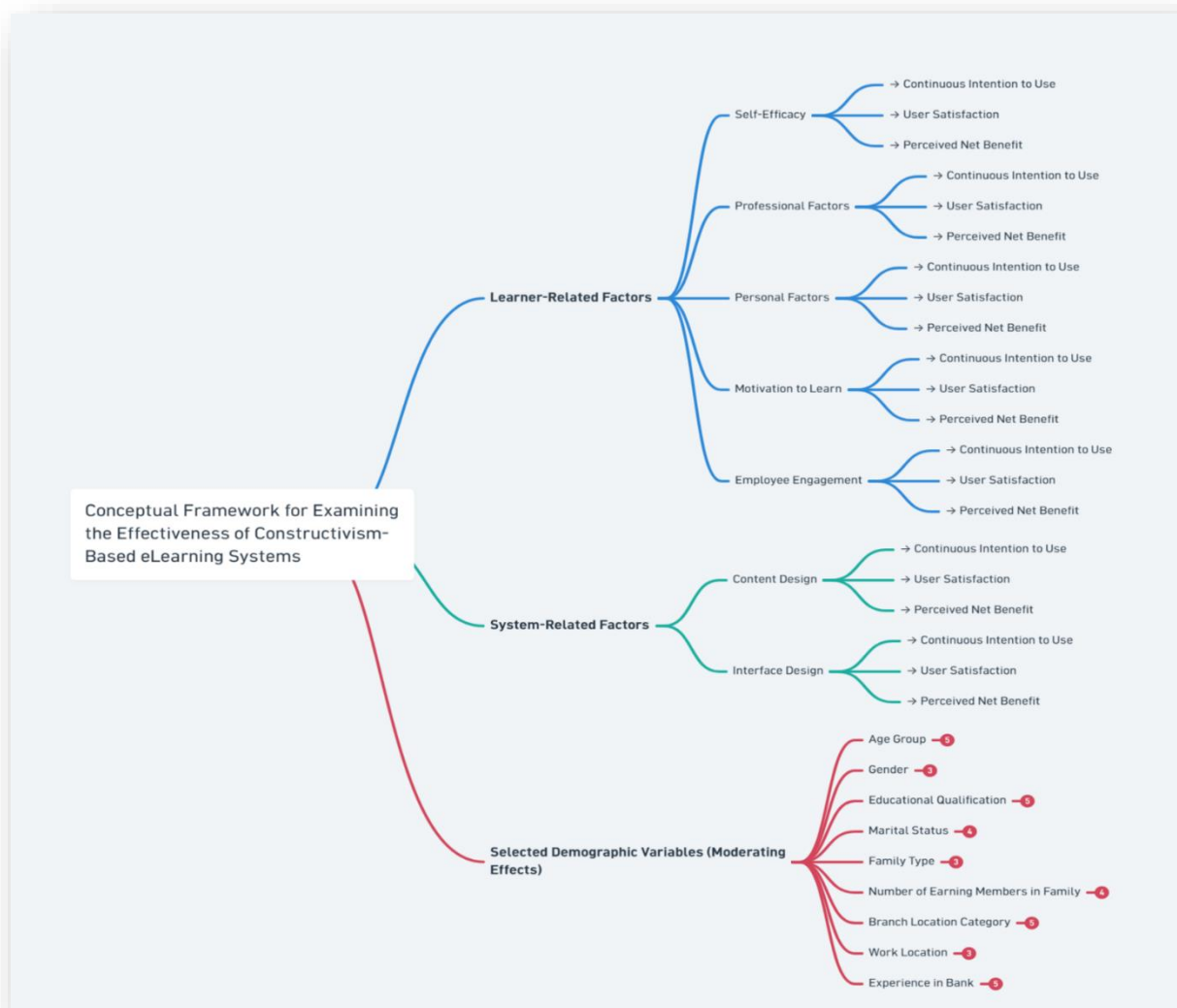
Based on the reviewed literature, the framework identifies **self-efficacy, professional factors, personal factors, motivation to learn, and engagement** as learner-related determinants influencing employees' interaction with constructivism-based e-learning systems. Prior studies indicate that learners' belief in their ability to use technology and perform learning tasks (self-efficacy) significantly influences e-learning acceptance and satisfaction (Marakas et al., 1998; Chien, 2012). Motivation to learn and engagement have also been consistently associated with increased participation, persistence, and learning effectiveness in digital learning environments (Chen & Kao, 2012; Bouvier et al., 2015; Giannakos et al., 2021).

In addition to learner-related factors, the framework incorporates **satisfaction with content design** and **satisfaction with interface design** as system-related determinants. Literature suggests that well-structured content, job relevance, clarity of learning objectives, and intuitive interface design significantly contribute to user satisfaction and continued usage of e-learning systems (Duangekanong et al., 2012; Chang et al., 2020; Hong et al., 2017). These system characteristics are particularly important in organizational settings where learners possess diverse backgrounds and varying levels of technological familiarity.

The outcome variables in the framework include **continuous intention to use**, **user satisfaction**, and **perceived net benefit**. Continuous intention to use reflects the sustainability of e-learning adoption over time (Lee, 2010; Esterhuyse et al., 2016). User satisfaction represents employees' overall evaluation of their learning experience, while perceived net benefit captures both individual-level outcomes, such as improved job performance and confidence, and organizational-level outcomes, such as enhanced training effectiveness and value creation (Alvarez et al., 2004; Chen, 2010).

Further, the framework acknowledges the **moderating role of demographic variables** such as age, gender, education qualification, experience, and work context. Prior studies suggest that demographic characteristics may influence learners' perceptions of e-learning systems and their learning outcomes; however, such moderating effects remain insufficiently examined within constructivism-based e-learning frameworks, particularly in the banking sector. Accordingly, demographic variables are incorporated as moderators influencing the relationships between constructivism-based e-learning determinants and outcome variables.

The conceptual framework used in the study thus provided a comprehensive structure for examining the effect of constructivism-based e-learning on Bank of Baroda employees. It serves as the basis for hypothesis formulation and empirical testing in the present study.



7. HYPOTHESES

Hypotheses Related to Continuous Intention to Use

H₀1a: Employees' self-efficacy does not significantly influence their continuous intention to use constructivism based e-learning systems.

H₁1a: Employees' self-efficacy significantly influences their continuous intention to use constructivism based e-learning systems.

H₀1b: Professional factors do not significantly influence employees' continuous intention to use constructivism based e-learning systems.

H.1b: Professional factors significantly influence employees' continuous intention to use constructivism based e-learning systems.

H.1c: Personal factors do not significantly influence employees' continuous intention to use constructivism based e-learning systems.

H.1c: Personal factors significantly influence employees' continuous intention to use constructivism based e-learning systems.

H.1d: Employees' motivation to learn does not significantly influence their continuous intention to use constructivism based e-learning systems.

H.1d: Employees' motivation to learn significantly influences their continuous intention to use constructivism based e-learning systems.

H.1e: Employee engagement does not significantly influence continuous intention to use constructivism based e-learning systems.

H.1e: Employee engagement significantly influences continuous intention to use constructivism based e-learning systems.

H.1f: Content design does not significantly influence employees' continuous intention to use constructivism based e-learning systems.

H.1f: Content design significantly influences employees' continuous intention to use constructivism based e-learning systems.

H.1g: Interface design does not significantly influence employees' continuous intention to use constructivism based e-learning systems.

H.1g: Interface design significantly influences employees' continuous intention to use constructivism based e-learning systems.

Hypotheses Related to User Satisfaction

H.2a: Employees' self-efficacy does not significantly influence their satisfaction with constructivism based e-learning systems.

H₁2a: Employees' self-efficacy significantly influences their satisfaction with constructivism based e-learning systems.

H₀2b: Professional factors do not significantly influence employees' satisfaction with constructivism based e-learning systems.

H₁2b: Professional factors significantly influence employees' satisfaction with constructivism based e-learning systems.

H₀2c: Personal factors do not significantly influence employees' satisfaction with constructivism based e-learning systems.

H₁2c: Personal factors significantly influence employees' satisfaction with constructivism based e-learning systems.

H₀2d: Employees' motivation to learn does not significantly influence their satisfaction with constructivism based e-learning systems.

H₁2d: Employees' motivation to learn significantly influences their satisfaction with constructivism based e-learning systems.

H₀2e: Employee engagement does not significantly influence employees' satisfaction with constructivism based e-learning systems.

H₁2e: Employee engagement significantly influences employees' satisfaction with constructivism based e-learning systems.

H₀2f: Content design does not significantly influence employees' satisfaction with constructivism based e-learning systems.

H₁2f: Content design significantly influences employees' satisfaction with constructivism based e-learning systems.

H₀2g: Interface design does not significantly influence employees' satisfaction with constructivism based e-learning systems.

H_{2g}: Interface design significantly influences employees' satisfaction with constructivism based e-learning systems.

Hypotheses Related to Perceived Net Benefits

H_{3a}: Employees' self-efficacy does not significantly influence the perceived net benefits derived from constructivism based e-learning systems.

H_{3a}: Employees' self-efficacy significantly influences the perceived net benefits derived from constructivism based e-learning systems.

H_{3b}: Professional factors do not significantly influence the perceived net benefits derived from constructivism based e-learning systems.

H_{3b}: Professional factors significantly influence the perceived net benefits derived from constructivism based e-learning systems.

H_{3c}: Personal factors do not significantly influence the perceived net benefits derived from constructivism based e-learning systems.

H_{3c}: Personal factors significantly influence the perceived net benefits derived from constructivism based e-learning systems.

H_{3d}: Employees' motivation to learn does not significantly influence the perceived net benefits derived from constructivism based e-learning systems.

H_{3d}: Employees' motivation to learn significantly influences the perceived net benefits derived from constructivism based e-learning systems.

H_{3e}: Employee engagement does not significantly influence the perceived net benefits derived from constructivism based e-learning systems.

H_{3e}: Employee engagement significantly influences the perceived net benefits derived from constructivism based e-learning systems.

H_{3f}: Content design does not significantly influence the perceived net benefits derived from constructivism based e-learning systems.

H.3f: Content design significantly influences the perceived net benefits derived from constructivism based e-learning systems.

H.3g: Interface design does not significantly influence the perceived net benefits derived from constructivism based e-learning systems.

H.3g: Interface design significantly influences the perceived net benefits derived from constructivism based e-learning systems.

Hypotheses Related to Moderating Effects of Demographic Variables

H.4a: Selected demographic variables do not significantly moderate the relationship between constructivism based e-learning factors and employees' continuous intention to use, such that the strength of this relationship does not vary across different demographic groups.

H.4a: Selected demographic variables significantly moderate the relationship between constructivism based e-learning factors and employees' continuous intention to use, such that the strength of this relationship varies across different demographic groups.

H.4b: Selected demographic variables do not significantly moderate the relationship between constructivism based e-learning factors and employees' satisfaction, such that the strength of this relationship does not vary across different demographic groups.

H.4b: Selected demographic variables significantly moderate the relationship between constructivism based e-learning factors and employees' satisfaction, such that the strength of this relationship varies across different demographic groups.

H.4c: Selected demographic variables do not significantly moderate the relationship between constructivism based e-learning factors and perceived net benefits, such that the strength of this relationship does not vary across different demographic groups.

H.4c: Selected demographic variables significantly moderate the relationship between constructivism based e-learning factors and perceived net benefits, such that the strength of this relationship varies across different demographic groups.

8. RESEARCH METHODOLOGY

Research Design

The study adopted a quantitative research approach and follows a descriptive and exploratory research design. The study is cross-sectional in nature and aims to empirically examine the effect of constructivism-based e-learning on employees of Bank of Baroda by analysing the relationships between constructivism-based e-learning determinants and selected outcome variables.

Population of the Study

The population of the study comprised employees of Bank of Baroda who had successfully completed the selected constructivism-based e-learning modules through the Baroda Gurukul Learning Management System.

Sample and Sampling Technique

The sample for the study consists of 399 employees of Bank of Baroda. A stratified random sampling technique was employed to ensure adequate representation of employees across different constructivism-based e-learning modules. The population was divided into three strata based on the type of constructivism-based e-learning module undertaken. For each stratum, a sampling frame comprising employees who had completed the respective module was prepared using learning management system records. Randomization was carried out independently within each stratum using a simple random sampling method. An equal number of respondents (133) were selected from each stratum, resulting in a total sample size of 399.

Data Collection

The study was based on primary data collected using a structured questionnaire. The questionnaire was designed with reference to constructivist learning theory and prior e-learning literature. Responses were measured using a five-point Likert scale ranging from Strongly Disagree to Strongly Agree. The questionnaire captured data related to constructivism-based e-learning determinants, outcome variables, and demographic characteristics of respondents.

Variables of the Study

The variables considered in the study were categorized as follows:

Independent Variables (Constructivism-Based E-Learning Determinants):

- Self-efficacy
- Professional factors
- Personal factors
- Motivation to learn
- Employee engagement
- Content design
- Interface design

Dependent Variables (Outcome Variables):

- Continuous intention to use
- User satisfaction
- Perceived net benefit

Moderating Variables:

- Age
- Gender
- Educational qualification
- Marital status
- Family type
- Number of earning members
- Work experience
- Branch location category
- Working in home state or other state
- Working in branch or administrative office

Reliability of the Instrument

The reliability of the research instrument was assessed using Cronbach's alpha to examine the internal consistency of the measurement scales. The results indicated acceptable reliability levels for all constructs, confirming the suitability of the instrument for further statistical analysis.

Data Analysis Techniques

Considering the nature of the data and its distribution characteristics, appropriate statistical techniques were employed for data analysis. The following techniques were used:

- Descriptive statistics

- Chi-square test of independence
- Mann–Whitney U test
- Kruskal–Wallis H test
- Spearman’s Rank Correlation Analysis
- Multiple Linear Regression Analysis
- General Linear Model (GLM) for moderation analysis

These techniques were used to examine relationships among the study variables, assess differences across demographic groups, examine the influence of constructivism-based e-learning determinants on continuous intention to use, user satisfaction, and perceived net benefit, and evaluate selected moderating effects of demographic variables.

Ethical Considerations

The study ensured **confidentiality and anonymity** of the respondents. Participation was voluntary, and the data collected were used solely for academic research purposes.

9. DATA ANALYSIS

The data collected through the structured questionnaire were coded, tabulated, and analyzed using appropriate statistical techniques. Prior to hypothesis testing, descriptive statistics, reliability assessment, and normality assessment were conducted to examine the characteristics and suitability of the data for further analysis.

The Shapiro–Wilk test indicated that the study variables deviated significantly from normality. Accordingly, non-parametric statistical techniques were employed for demographic group comparisons and association analysis. The Chi-square test of independence was used to examine associations between categorical variables, while the Mann–Whitney U test and Kruskal–Wallis H test were employed to examine differences across demographic and professional groups. Spearman’s Rank Correlation Analysis was used to assess the strength and direction of relationships among the study constructs and outcome variables.

Multiple Linear Regression Analysis was employed to examine the combined influence of learner-related and system-related determinants on continuous intention to use, user satisfaction, and perceived net benefit. Prior to regression analysis, relevant assumptions were assessed using appropriate diagnostic procedures, including tests for independence of residuals, multicollinearity, residual normality, and homoscedasticity.

Moderation hypotheses were examined separately using the General Linear Model (GLM) through interaction effects between selected demographic variables and study constructs. The results were interpreted at the appropriate level of statistical significance and presented in tabular and graphical form to facilitate clear understanding and interpretation.

10. ORIGINAL CONTRIBUTION OF THE STUDY

The study made both **theoretical and practical contributions** to the field of workplace e-learning, particularly in the context of constructivism-based digital learning systems in the banking sector.

From a **theoretical perspective**, the study contributed by integrating constructivist learning theory with empirically validated e-learning determinants within a single analytical framework. While prior research has examined individual constructs such as self-efficacy, motivation, engagement, and satisfaction in isolation, the present study brings these constructs together to examine their combined influence on key e-learning outcome variables—continuous intention to use, user satisfaction, and perceived net benefit. The study thus extends existing e-learning literature by empirically validating a **comprehensive constructivism-based e-learning framework** in an organizational learning context.

From an **empirical perspective**, the study provides evidence from a **large Indian public sector bank**, a context that has received limited attention in prior constructivism-based e-learning research. By focusing on employees of Bank of Baroda who have undertaken constructivism-based e-learning modules, the study offers context-specific insights that enhance the applicability of constructivist learning principles in professional and regulated environments such as banking.

The study also contributed by examining the moderating role of selected demographic and work-related variables in the relationships between constructivism-based e-learning determinants and outcome variables. The interaction analysis provided evidence of specific moderating effects associated particularly with experience and branch location category. This aspect of the research provides a more detailed understanding of how selected employee and work-related characteristics may influence the relationships between e-learning determinants and learning outcomes.

From a **practical perspective**, the findings of the study are expected to assist training designers, learning and development professionals, and policy makers in banks and similar organizations in designing and implementing more effective constructivism-based e-learning systems. The insights derived from the study can support evidence-based decisions related to instructional design, learner engagement strategies, and system usability, ultimately enhancing the effectiveness and sustainability of organizational e-learning initiatives.

11. MAJOR FINDINGS OF THE STUDY

The major findings of the study were derived from empirical analysis conducted using Multiple Linear Regression, non-parametric statistical techniques, and General Linear Model (GLM)-based interaction analysis. Preliminary correlation and non-parametric analyses provided initial evidence regarding associations and group-level differences. Multiple Linear Regression was subsequently used to examine the influence of the study determinants on the three outcome variables, while GLM-based interaction analysis was used to examine selected moderating effects.

Findings Related to Continuous Intention to Use

The analysis indicated that self-efficacy, personal factors, motivation to learn, and employee engagement were significant positive predictors of employees' continuous intention to use constructivism-based e-learning. Among these, motivation to learn emerged as the strongest predictor, followed by personal factors, employee engagement, and self-efficacy. Professional factors, content design, and interface design were not statistically significant predictors.

Findings Related to User Satisfaction

The findings related to user satisfaction revealed that employee engagement, content design, personal factors, interface design, and self-efficacy were significant predictors of employees' satisfaction with constructivism-based e-learning systems. Among these, employee engagement emerged as the strongest predictor, followed by content design, personal factors, interface design, and self-efficacy. Professional factors and motivation to learn were not statistically significant predictors.

Findings Related to Perceived Net Benefit

The analysis related to perceived net benefit showed that personal factors, professional factors, employee engagement, motivation to learn, and interface design were significant predictors of employees' perceived net benefit from constructivism-based e-learning. Personal factors emerged as the strongest predictor, followed by professional factors, employee engagement, motivation to learn, and interface design. Self-efficacy and content design were not statistically significant predictors.

Findings Related to Demographic Differences

The Mann–Whitney U and Kruskal–Wallis H tests indicated that demographic groups generally did not differ significantly with respect to continuous intention to use, user satisfaction, and perceived net benefit. A statistically significant difference was observed for user satisfaction across operations experience categories; however, this variable was applicable only to respondents who had completed the Handling Bank Notes at Counter module and therefore represents a course-specific finding.

Findings Related to Moderating Effects

The moderation analysis using GLM-based interaction effects indicated that selected demographic variables moderated specific relationships between constructivism-based e-learning determinants and the outcome variables.

Experience significantly moderated the relationships between professional factors and continuous intention to use, user satisfaction, and perceived net benefit. Experience also significantly moderated the relationships between personal factors and all three outcome variables. Further, the interaction between interface design and experience was significant for user satisfaction and perceived net benefit.

Branch location category significantly moderated the relationship between content design and continuous intention to use, user satisfaction, and perceived net benefit.

The moderation findings are specific to the interaction effects examined in the study and should not be interpreted as evidence that all demographic variables moderate all construct–outcome relationships.

12. ACHIEVEMENT OF OBJECTIVES AND CONCLUSION

The study was undertaken to examine the effectiveness of constructivism-based e-learning among employees of Bank of Baroda using an integrated conceptual framework and empirical analysis. Each of the stated objectives was addressed through systematic data analysis, and their achievement is evidenced through the study's findings.

The first objective, which aimed to identify the driving factors influencing employees' continuous intention to use constructivism-based e-learning, has been achieved through Multiple Linear Regression Analysis. The findings demonstrate that self-efficacy, personal factors, motivation to learn, and employee engagement significantly influence employees' continuous intention to use e-learning systems.

The second objective, which focused on exploring employees' satisfaction with constructivism-based e-learning systems, has been achieved by identifying employee engagement, content design, personal factors, interface design, and self-efficacy as significant predictors of user satisfaction.

The third objective, which examined the net benefit achieved by individuals as well as the organization through constructivism-based e-learning, has been fulfilled through findings showing that personal factors, professional factors, employee engagement, motivation to learn, and interface design significantly influence perceived net benefit.

The fourth objective, which sought to analyze the moderating influence of demographic variables on employees' continuous intention to use, user satisfaction, and perceived net benefit, has been addressed through GLM-based interaction analysis. The findings indicate that experience significantly moderated the relationships of professional factors, personal factors, and interface design with selected outcome variables, while branch location category significantly moderated the relationship between content design and the three outcome variables.

In conclusion, the study provides empirical evidence that constructivism-based e-learning effectiveness is multidimensional and is influenced by a combination of learner-related and system-related factors. Self-efficacy, personal factors, motivation to learn, employee engagement, content design, and interface design demonstrated significant relationships with

different dimensions of e-learning effectiveness. The findings further indicate that selected demographic and work-related characteristics moderate specific relationships among the study constructs. Overall, the study provides empirical evidence regarding the effectiveness of constructivism-based e-learning among Bank of Baroda employees and offers insights for the design and evaluation of workplace e-learning initiatives.

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