BUFT Journal of Business & Economics (BJBE)
ISSN 2664-9942 (Print)
2025 Volume 6, Pg: 517-534
DOI: https://doi.org/10.58481/BJBE/2529

Enhancing E-learning through Facebook Groups: The Mediating Role of Student Engagement

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ARTICLE INFO

Article History
Received: July 25, 2025,
Accepted: October 19, 2025

Keywords:
E-learning, Facebook Groups, Perceived Usefulness, Social Influence, Hedonic Motivation, Students' Engagement, Students' intention to use.

JEL Classification:
I21, I23, D83, L86

ABSTRACT

Purpose: The purpose of this study is to explore whether higher educational institutes' e-learning programs on Facebook groups enhance Students' intention to use (IU) E-learning Programs or not by identifying influential determinants. By drawing on the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), Theory of Reasoned Action (TRA), and Student Engagement (SE) theory, this study assessed the role of SE in e-learners' IU on Facebook perspectives.

Methodology: This research applies quantitative research methodology using non-probability purposive sampling of a total of 211 higher secondary to post-graduate students in higher educational institutes, private and public universities in Bangladesh who are familiar and associated with e-learning programs of Facebook groups. Structural equation modeling (SEM) and mediation analysis as the data analysis method have been implemented by applying Co-Variance Structural Equation Modeling (CB-SEM).

Findings: The result reveals that perceived ease of use (PEOU) and perceived usefulness (PU) from TAM, and social influence (SI) from the UTAUT model significantly affecting students' intention to use (IU) Facebook groups, with the strong effect of mediation of students' engagement (SE), except for the insignificant impact of hedonic motivation (HE).

Practical Implications: Following the studies' implications and future recommendations, educators and e-learning providers should make Facebook groups more effective and enjoyable by integrating engagement with educational usage.

Originality/Value: The originality of this study is in extending the four separate theories and models in enhancing students' future use of Facebook groups for e-learning programs, with the engagement level as a mediator in 'Meta.'

Limitations: The present study employs a non-probability sampling method without the consideration of cross-cultural concerns and socio-demographic factors, focusing on other social media. Drawing on these issues, future academics should approach PLS-SEM, LISREL, and workable moderating variables.

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1. Introduction

E-learning is the combination of all patterns of teaching-learning aids accessed via electronic devices (Moghavvemi et al., 2017), the implementation of information and technology through Internet access for better learning understanding (Eger, 2015). This is comprised of video and image content, text-based content, social media, blogs, vlogs, podcasts, and wikis (Moghavvemi et al., 2017), in which Facebook, a social networking site (SNS), has become popular as an e-learning tool (Yel et al., 2019; Suwandee et al., 2016; Jumaat and Tasir, 2016; Hosny and Fatima, 2012). Though mostly seen as a social networking platform nowadays, in 2004, Facebook was initially designed to collaborate educational resources for college students networking (Chiroma et al., 2017), permitting individuals to be associated in a pre-defined online communal relationship through a website (Chou and Pi, 2015; Irwin et al., 2012). Moreover, online group discussions, forums, and solving problems on Facebook generate students' willingness to participate more in educational content, improving persuasive skills (Hosny and Fatima, 2012) and extending the benefits beyond the classroom (Chiroma et al., 2017). Participants for distributing quizzes, links, and video content are interestingly (Hosny and Fatima, 2012). Young students appreciate using Facebook as a learning tool for spontaneous usage and virtual collaboration (Cerdà and Planas, 2011). Also, students can get the best collaborative learning experience, stimulated self-experience, and esteem with the exchange of reinforced comments and appreciation of academic posts (Hosny and Fatima, 2012), in which teachers consider them as 'co-partners' on Facebook using web-based upgraded user-interfaces to undertake high-level tasks (Insorio and Olivarez, 2021; Chou and Pi, 2015; Cerdà and Planas, 2011).

Regarding higher educational e-learning programs, Facebook usage has been extensively measured in diverse developing countries: asynchronous and synchronous learning (Wong and Wong, 2016; Chou and Pi, 2015; Qureshi et al., 2014), language learning for elementary distance learning in Indonesia (Muhsyanur et al., 2020), private universities to connect, engage and communicate in Thailand (Suwandee et al., 2016), improving writing skills in Malaysia, (Yunus and Salehi, 2012), student engagement in Iraq (Al-Azawei, 2019), and foreseeing e-learning effectiveness on a non-commercial SNS 'Ning' (Brady et al., 2010). Also, the role of Facebook in the interactive learning perspective has been comprehensively investigated. For example, students and teachers' academic discussions (Jumaat and Tasir, 2016), librarians' perspectives in augmenting traditional classroom teaching (Hosny and Fatima, 2012), social relationships and participation (Lam, 2012), developing the professional community (Pimmer et al., 2012), programs offered in universities (Giannikas, 2020), and undergraduate and postgraduate students (Moghavvemi et al., 2017).

Facebook can be alternatively used as a learning management system (LMS), as through Facebook groups, information sharing and announcement posts can be quickly disseminated among students (Giannikas, 2020; Moghavvemi et al., 2017). Notably, Facebook groups, chat groups, and pages can be successfully utilized as a blended learning method with traditional classroom lectures (Chiroma et al., 2017). 'Meta' has inaugurated more special options for group interaction (Alison, 2022). Launched in 2012, the Facebook group has become increasingly popular for user interaction and resource sharing, and it is focused on ease of operation (Choi and Pi, 2015). Besides, it is easy to operate, applicable for educational data search, and graphical user interface for educational purposes compared to Moodle (Petrovic et al., 2014). Referring to social app users as ‘intellectual partners’, Cerdà and Planas (2011, p. 198) reinforced the importance of virtual communities of young students’ self-creativity using Facebook in attaining shared educational goals for inter-cluster solidarity. Moreover, ‘social knowledge’ is augmented through Facebook groups comprised of open, closed, and secret groups, compared with the individual connections through various communal-practice tools (Cerdà and Planas, 2011, p. 200). Likewise, students who use Facebook groups for learning have higher grades than others who do not join the group (Chiroma et al., 2017). Connecting to this, customized networking, search, tags, location tracking, personal messaging, and smartphone module sharing are the core interactive competency-based native tools allowing collaborative learning experience through Facebook groups (Cerdà and Planas, 2011).

Earlier authors have stated that the Facebook group allows educational content to be accessed flexibly, assuring the highest interaction, working as an effective e-learning tool among university instructors (Giannikas, 2020), and impacting continuous use intention (Chou and Pi, 2015). The flexible configuration and structure of Facebook groups allow for posting educational resources, positively influencing peer evaluation and individual interests in and out-of-class activities (Doğan and Gülbahar, 2018; Yunus and Salehi, 2012). Accordingly, by segmenting three groups based on privacy, open, closed, and secret, Cerdà and Planas (2011) prescribed that closed groups effectively stimulate member interactions. However, compared to Facebook groups, the Moodle platform caused students' dissatisfaction due to late responses, login problems, and functional complexity (Albayrak and Yildirim, 2015). This is similar to the bulletin board system (BBS) that Jong et al. (2014) revealed.

Drawing on the above evidence, how Facebook can be effectively exploited to pursue academic objectives has been overlooked by earlier scholars, so more research is required (Moghavvemi et al., 2011; Cerdà and Planas, 2011). A dearth of research has been generated in an emerging country like Bangladesh to examine the antecedents of Facebook groups for e-learning programs in students' intention to use (IU) behavior through the mediating effect of students' engagement. This research reconfigured the usability of Facebook in e-learning by integrating the attributes of perceived usefulness (PU) and perceived ease of use (PEOU) from TAM, hedonic motivation (HM), and social influence (SI) from the UTAUT model in the proposed model to answer the call of earlier research. Furthermore, by adding the mediating variable of students' engagement to the model, this research generates a new paradigm of knowledge extension in these models and theories to intention to use Facebook groups for e-learning programs. The remainder of this paper is segmented into six sections: after the introduction and literature review, followed by research methodology, findings and analysis, discussions and conclusions, and recommendations.

2. Literature Review

On Facebook groups, learning resources are uploaded by the group admin or instructor in the form of videos, reels, live videos, images or screenshots, Word files, PDFs, and PowerPoint presentations (Al-Azawei, 2019; Chou and Pi, 2015), to enhance students' engagement and frequent use. The features of Facebook are very compatible with the learning resources among the students using Internet-connected smartphones (Moghavvemi et al., 2017; Khan and Bakhsh, 2015; Pimmer et al., 2012), resulting in broader dependability for e-learning program providers. This enhances students' willingness to use Facebook for e-learning programs in the future, which has not yet been examined, reflecting which antecedents of Facebook groups may enhance intention-to-use with the causal effect of engagement. This is incorporated in this research by understanding the interplay of cognitive, affective, and behavioral engagement levels from Evans and Zhu (2023) and Hoi and Hang (2021) to reveal the influence of intention to use the e-learning program offered by higher education institutes via Facebook groups, considering its wider acceptability among students aged above 18. However, interaction with instructors resulted in the most substantial effect (Chou and Pi, 2015), an integral aspect of accomplishing group tasks, feedback, and preparation of course assignments in any e-learning system (Martin and Bolliger, 2018). Additionally, student-to-student interaction has resulted in an insignificant relationship to e-learners' satisfaction with the Facebook groups (Cerdà and Planas, 2011), likewise for pre-service course learning environment teachers (Doğan and Gülbahar, 2018). Connected to this, several literature review-based studies explored that Facebook positively influences students' performance as a teaching-learning tool for higher educational institutions, for instance, Chiroma et al. (2017), Jumaat and Tasir (2016) Manca and Ranierit (2016), in student-teacher interaction and collaborative discussion, develop persuasive communication. Also, earlier scholars have specified Facebook is the best social networking sites (SNS) for triggering mutual interaction with meaningful information among people all over the ages, examining the Technology Acceptance Model (TAM) of Davis (1989), the Unified Theory of Acceptance and Use of Technology (UTAUT) of Venkatesh et al. (2003), Theory of Reasoned Action (TRA) of Fishbein and Azjen (1975) widely: (Moorthy et al., 2019; Moghavvemi et al., 2017; Moghavvemi et al., 2017; Albayrak and Yildirim, 2015; Sa'nchez et al., 2010).

Student engagement (SE) has been widely examined by combining the interaction with teachers, peers, and content (Martin and Bolliger, 2018; Jumaat and Tasir, 2016; Chou and Pi, 2015; Sim et al., 2014), specifying it as the foundation for an interactive learning atmosphere (Martin and Bolliger, 2018; Wang et al., 2013). SE means specifying sensory efforts toward any activity (Martin and Bolliger, 2018). Previously, students expressed their engagement by collaborating on group tasks, developing presentations, contributing resources to the discussions, and sharing self-understanding about the subject Martin and Bolliger, 2018). The feature of liking, commenting, and sharing institutional academic posts on Facebook groups motivates students to participate in the peer-sessions (Yunus and Salehi, 2012) in higher education e-learning programs (Yel et al., 2019; Doğan and Gülbahar, 2018; Martin and Bolliger, 2018; Wang et al., 2013). Consequently, community dynamism is developed (Moghavvemi and Janatabadi, 2017; Qureshi et al., 2014), effortless operation of the Facebook group (Suwandee et al., 2016) influences students' satisfaction (Choi and Pi, 2015).

Connected to the above, to accept any new technology for solving any intended action, Davis's (1989) Technology Acceptance Model (TAM) is most famous among academics, comprised of two constructs: perceived usefulness (PU) denotes the belief of an individual about a new technological adoption in improving the intended act (Davis, 1989), and perceived ease-of-use (PEOU) is the extent to use any new technological system without any struggle (Davis, 1989). Also, the individual's willingness to perform a specific behavior is referred to as the intention-to-use (IU) system proposed by Davis (1989), extending the TRA model. Thus, if Facebook users believe the e-learning program enhances their performance through effortless use, their future behavior toward using Facebook is expected to be established (Sa'nchez et al., 2010). Online learning teacher-student collaboration inspired significant participation in quizzes, group presentations, assignments, and questions (Moghavvemi et al., 2017; Moghavvemi and Janatabadi, 2017), which are the expressions of actual behavior through the adoption of the Facebook group as a new medium of technology. Furthermore, the number of likes, comments, and shares on the course's Facebook page posts resulted in a positive correlation between PU and PEOU towards IU (Albayrak and Yildirim, 2015).

A Unified Theory of Acceptance and Use of Technology (UTAUT) was initially developed by Venkatesh et al. (2003) to explain users' technology acceptance, similarly be interpreted as measuring students' acceptance of Facebook use as a means of new technology in e-learning (Moghavvemi et al., 2017), by the five determinants: performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), and intention to use (IU) (Venkatesh et al., 2013). This research considers hedonic motivation (HM) is the experience of perceived enjoyment, pleasure, and emotional values of using a technological system (Moghavvemi et al., 2017; Moghavvemi and Janatabadi, 2017; Venkatesh et al., 2003). Supported by these authors, presently, it is necessary to investigate whether higher education students are motivated to use e-learning programs' Facebook groups in the future, driven by fun, enjoyment, or pleasure in the system, and accept it for IU of e-learning purposes. Indeed, pleasure and social influence derived from a technological system correlated strongly with the intention-to-use, explored by earlier authors (Moorthy et al., 2019; Moghavvemi et al., 2017; Moghavvemi and Janatabadi, 2017). Integrating social influence, which means any person discerning peer beliefs while adopting new technological adoption (Moghavvemi et al., 2017; Moghavvemi and Janatabadi, 2017; Venkatesh et al., 2003), to explore whether any students' intention to use in the Facebook group for e-learning as the medium of new technology, is correlated with other persons or not to be in the same community. Corresponding to communication value, this determinant is shaping students' self-confidence (Jumaat and Tasir, 2016; Suwandee et al., 2016), reciprocal interaction (Sim et al., 2014; Cerdà and Planas, 2011), and generating teacher-student openness (Lam, 2012), in a technological system supported by their friends and teachers for its future use. The tagging, post updates, notification alarms, and follow buttons increase students' desire to be attached to the learning community content. Thus, interest in the study is generated (Jumaat and Tasir, 2016).

Author and Year	Methodology, Origin, Sample Size, and Techniques	Major Findings	Focused Area of Education	Application in E-learning Programs	Facebook Groups' Application in E-learning Programs with Students' Engagement
Al Azawei (2019)	• Quantitative methodology applying PLS-SEM. • 143 university undergraduates in Iraq are surveyed online by non-probabilistic convenience sampling.	Technology use and learner satisfaction are positively correlated both on Facebook and Moodle, with a satisfactory causal relationship.	Higher education	-	-
Chiroma et al. (2017)	• Qualitative methodology applies an extensive literature review. • 49 studies on Facebook for teaching-learning have been reviewed through the data extraction process.	Interaction and collaboration among students are improved through Facebook as a learning tool in higher education.	Tertiary education	-	-
Chou and Pi (2015)	• Quantitative methodology applying PLS-SEM. • 107 university undergraduates using Facebook groups in Taiwan are surveyed online by non-probabilistic purposive sampling.	Technology quality and interaction with the instructor positively impact e-learners' perceived satisfaction, further influencing the intention of continuous use of Facebook Groups as a learning tool.	Undergraduate	Yes	-
Doğan and Gülbahar (2018)	• Qualitative methodology, an open-ended questionnaire survey is approached through a Google form. • 27 pre-service teachers' responses are analyzed regarding the use of Facebook as a learning environment in an educational context; the sample is selected by non-probability convenience sampling.	Pre-service teachers use Facebook as a teaching-learning tool in the blended learning system for distributing learning materials and increasing interpersonal activities.	Social-media-enriched blended course	-	-
Eger (2015)	• In quantitative methodology, data are analyzed through regression analysis. • 512 e-learners in the Czech Republic are surveyed online among graduation students using purposive sampling.	In driving the teaching and learning process, Facebook effectively generated positive results for the instructors and students, both for traditional and e-learning systems.	Undergraduate	Yes	-
Jong et al. (2014)	• Quantitative methodology applying multiple regression analysis. • 387 students in Taiwan participated in the online survey through convenience sampling.	Peer discussion about educational issues resulted in significant results on the Facebook page. However, compared to Facebook and the bulletin board system (BBS), the BBS is perceived as much more satisfactory regarding the discussions on course c ontents.	Graduation	Yes	
Khan and Bakhsh (2015)	• Qualitative methodology applied in online in-depth interview sessions. • 20 faculty members are interviewed for a course's Facebook page and group in e-learning.	Facebook groups and pages are bringing maximum collaboration, online discussions, and interaction among students and faculty if integrated into the e-learning of a course, officially approved by the policymakers.	Undergraduate and Post - graduate	Yes	
Martin and Bolliger (2018)	• Quantitative methodology applying regression analysis. • 155 university students in the United States were surveyed online by non-probabilistic convenience sampling	Engagement strategies for learner-to-instructor resulted in the highest correlation compared to learner-to-learner and content. Getting updates on learning content and preparing assignments resulted in beneficial engagement strategies in the other two categories.	University Students	-	

Moghavvemi et al. (2017)	• Quantitative methodology applying structural equation modeling (SEM). • 170 Undergraduate students in Malaysia are surveyed online by non-probabilistic purposive sampling.	Playfulness resulted in a significant determinant extending the UTAUT2 on Facebook, investigating students' intention to use e-learning, while habit and facilitating conditions all positively impacted students' use of e-learning via Facebook	Undergraduate Students	Yes
Moorthy et al. (2018)	• Quantitative methodology applying regression analysis. • 298 undergraduate university students in Malaysia were surveyed online by non-probability quota sampling. Convenience sampling.	The model added perceived enjoyment and self-efficacy to the TAM model. Except for perceived usefulness, all determinants resulted in positive behavioral use of Facebook in learning.	University undergraduates	-

Source: Authors Compilation

However, in connection with the literature discussed in Table 1, it is evident that the studies did not focus on the recent features and configuration of groups on 'Meta,' the renewed version of Facebook. Additionally, for a thriving learning environment on Facebook, Doğan and Gülbahar (2018) posited that the students and the instructors with the voluntary educational use of Facebook must establish participation.

Thus, to fulfill the available research gap, the following two research questions are addressed in this research:

RQ 1. Which attributes of Facebook groups for e-learning programs enrich students' intention to use Facebook among higher education institutes?

RQ 2. How do these attributes impact student engagement, enhancing students' intention to use Facebook in higher education institutes for e-learning programs?

Notably, considering the above discussion, the research model proposed and examined presently is shown in Figure 1. Here, PU, PEOU, HM, and SI are hypothesized to be the antecedents of IU for e-learning programs via Facebook groups of higher educational students in Bangladesh, by integrating SE to see the mediating effect of PU, PEOU, HM, and SI on IU. Therefore, the following hypotheses are proposed:

H1: *Students' engagement (SE) positively mediates the effects of* ***perceived usefulness (PU)*** *of Facebook groups on e-learning programs.*

H2: *Students' engagement (SE) positively mediates the effects* ***of perceived ease of use (PEOU) of*** *Facebook groups on e-learning programs.*

H3: *Students' engagement (SE) positively mediates the effects of* ***hedonic motivation (HM)*** *of Facebook groups on e-learning programs.*

H4: *Students' engagement (SE) positively mediates the effects of* ***social influence (SI)*** *of Facebook groups on e-learning programs.*

H5: *The* ***perceived usefulness (PU)*** *of Facebook groups on e-learning programs positively influences students' intention to use.*

H6: *The* ***perceived ease of use (PEOU)*** *of Facebook groups on e-learning programs positively influences students' intention to use.*

H7: *The* ***hedonic motivation (HM)*** *of Facebook groups on e-learning programs positively influences students' intention to use.*

H8: *The* ***social influence (SI)*** *of Facebook groups on e-learning programs positively influences students' intention to use.*

Finally, the proposed conceptual framework of the study is:

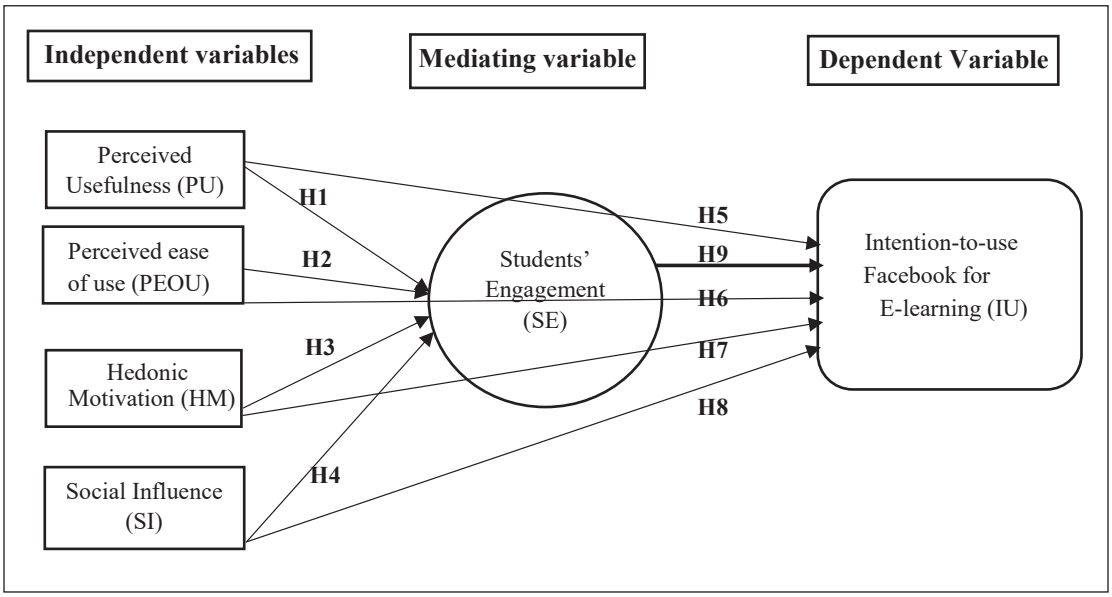

Figure 1. *Proposed Conceptual Framework of Facebook Groups in Enhancing Students' Intention to Use E-learning Programs*
Source**:** Authors Developed.

3. Research Methodology

3.1. Research Approach and Design

This research approaches quantitative methodology applying a deductive approach, justified by Saunders et al. (2012), by formulating a set of hypotheses for examining the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), Theory of Reasoned Action (TRA), and Student Engagement (SE) theory regarding Facebook groups perspectives. To empirically analyze the effect of Facebook on students' IU e-learning programs, the present study has adapted validated scales (see Table 2) examined by earlier scholars approaching minimum adoption. The questionnaire is structured, considering this study's research questions and hypotheses for the online survey method, ensuring Face validity and a pilot study. The data collection process used a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree) (Malhotra and Dash, 2016), which corresponds to 6 constructs consisting of 30 items adapted from Davis (1989) for PU and PEOU, Maqablet et al. (2021) for HM and SI, Evans and Zhu (2023) and Hoi and Hang (2021) for SE, and Yang and Lee (2010) and Venkatesh and Morris (2000) for IU.

Table 2. *Confirmatory Factor Analysis (CFA) for Convergent Validity*

Constructs	Measurement Scale	Source	M	SD	Items Loadings	Cronbach's alpha	CR	AVE
PU	PU1 Using Facebook in an e-learning program enables me to accomplish tasks more quickly.	Davis (1989)	5.10	1.42	.957	.885	.913	.810
	PU2 Using Facebook in an e-learning program improves my job performance.		5.49	1.20	.969			
	PU3 Using Facebook in an e-learning program improves and increases my productivity.		5.27	1.29	.934			
	PU4 Using Facebook in an e-learning program enhanced my effectiveness on the tasks.		5.62	1.41	.951			
	PU5 Using Facebook in an e-learning program makes it easier to do my tasks.		5.44	1.25	.947			
PEOU	PEU1 My interaction with Facebook in an e-learning program is clear and understandable.	Davis (1989)	5.58	1.35	.951	.874	.929	.838
	PEU2 I find Facebook in an e-learning program flexible to interact with.		5.21	1.44	.968			
	PEU3 I find it easy to use Facebook in an e-learning program to do what I want it to do.		5.86	1.43	.933			
	PEU4 Learning to operate Facebook in an e-learning program is easy for me.		5.62	1.78	.954			
	PEU5 It is easy for me to become skilled at using Facebook in an e-learning program		5.89	1.37	.947			
HM	HM1 I enjoy using Facebook to access the e-learning program services.	Maqabl et et al. (2021)	4.11	.95	.841	.883	.743	.719
	HM2 I have fun on Facebook while using the e-learning program.		3.92	.90	.898			
	HM3 I think scrolling on Facebook for the e-learning program is pleasurable.		3.45	1.24	.707			
	HM4 Compared to other things I could have done on Facebook, the time spent online using the e-learning program is truly entertaining.		3.03	.84	.836			
	HM5 I appreciate getting the updated information about the e-learning program on Facebook.		4.18	.93	.715			

SI	SI1 I can communicate with friends on Facebook about the e-learning program.	Maqableh et al. (2021)	5.72	1.05	.841	.867	.894	.801
	SI2 I can share experiences with others on Facebook about the e-learning program.		5.48	1.14	.897			
	SI3 I can progress friendships with other users on Facebook in an e-learning program.		5.59	1.46	.905			
	SI4 I can encompass personal relationships on Facebook in an e-learning program.		5.63	1.39	.858			
	SI5 I can increase my social acceptability among other people by using Facebook for e-learning.		5.37	1.09	.912			
SE	SE1 I can associate what I am learning on Facebook with what I learn in an e-learning program.	Evans and Zhu (2023), Hoi and Hang (2021)	5.49	1.68	.919	.845	.935	.857
	SE2 I like the e-learning program activities on Facebook		5.91	1.47	.920			
	SE3 I am content when I get good facilities for e-learning programs on Facebook.		5.55	1.35	.848			
	SE4 I take notes while participating in the e-learning program discussions on Facebook.		5.74	1.68	.927			
	SE5 I like, comment, and share the e-learning program discussions on Facebook.		5.62	1.65	.933			
IU	IU1 Facebook affects my intention to use e-learning programs.	Yang and Lee (2010), Venkatesh and Morris (2000)	5.18	1.79	.937	.878	.963	.811
	IU2 I intend to utilize the e-learning program facilities on Facebook rather than other social networking sites.		5.59	1.76	.944			
	IU3 Facebook affects my future choice of using e-learning programs.		4.95	.98	.875			
	IU4 I intend to use Facebook while using any facilities for e-learning programs.		5.87	1.57	.929			
	IU5 I am likely to use the e-learning facilities recommended on Facebook.		5.78	1.64	.956			
KMO and Bartlett's Test	**Measure of Sampling** .969	**Approx. Chi-Square** 3368.382			**df** 175		**Sig.** .000	

Source: Authors Calculation

3.2. Population, Sampling, and Data Collection

The study applies a structured survey questionnaire, in which the unit of analysis included was a Facebook users' community associated with any Facebook group of e-learning programs, between 18 and 57 years of age, living in urban regions of Bangladesh. The study participants are approached in urban areas because most of the higher education institutes, public and private universities in Bangladesh, are located in city areas where infrastructural support with population density is sufficient (Rahman et al., 2024). As per the available latest published source from the Bangladesh Bureau of Educational Information and Statistics (BANBEIS), the total number of students in higher education institutes, public and private universities, is 16161 on average (https://banbeis.portal.gov.bd, 2023). Considering this as the study population, there is no exact number of students utilizing Facebook groups for e-learning purposes in higher educational institutes in Bangladesh. Thus, the researcher employs non-probability purposive sampling to specify the sample size, as it is unrealistic to survey the whole higher education student population in the country because of limited time to gather all students' Facebook group usage data associated with e-learning purposes, unavailability of sampling frame, resources, and availability of the data (Bryman and Bell, 2011). Moreover, as this study approaches quantitative analysis, sample size adequacy must be between 200 to 400, representing the characteristics of the population, or for each independent variable, the expected level of observation is between 15 to 20 (Hair et al., 2014).

Given the hypotheses, this research has introduced two screening questions among the 250 respondents, ensuring validity (1. Are you familiar with the e-learning programs on Facebook? 2. Are you associated with any Facebook group of e-learning programs?) to decrease the unwanted responses. The Google form questionnaire link has been sent through the researchers' messenger account, email, and WhatsApp independently from January 2025 to March 2025. This process has accumulated a total of 228 respondents from 250 Facebook users, the validated sample size for a quantitative study (Hair et al., 2014); however, after conducting preliminary analysis of missing data and outliers, a total of 211 final responses remained for further analysis (see Table 3). This is also in line with the recommendation of Saunders et al. (2012) to utilize a minimum of 150 samples for 3 independent variables.

4. Data Analysis and Findings

The study constructs, measurement scales, along with the sources and results of confirmatory factor analysis (CFA), followed by exploratory factor analysis (EFA), are shown in Table 2. Before approaching Table 3, the data screening process, 17 invalid responses were removed through the Mahalanobis outlier (Pallant, 2016) in SPSS 26, resulting in 211 valid responses. The internal consistency is ensured through the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy of 0.969 through exploratory factor analysis (EFA) using the maximum likelihood extraction method of 30 items of the model (Pallant, 2016; Hair et al., 2014). This has resulted in each item's factor loading higher than 0.5 in Cronbach's alpha above the threshold value of 0.70 (Hair et al., 2014) (see Table 2). Therefore, no items are excluded. Next, the initial data screening in SPSS 26 and AMOS 23 is utilized for Confirmatory Factor Analysis (CFA) and has confirmed internal adequacy (Nunnally and Bernstein, 1994); thus, no validity concerns showing the divergent relationship of factors in Table 2 are produced.

The demographic information presented in Table 3 has revealed that among the 211 respondents, male students are the highest (53.56%) compared to female students. These respondents are aged between 18 and 27 (37.77%), mainly graduates and private service holders, along with the post-graduates and diploma and technical students, segmented into others. As this study covers several public and private universities, including the higher education institutes in Bangladesh, the majority of the respondents have already achieved their graduation and post-graduation degrees. They are earning a reasonable amount of income and are actively following Facebook groups for e-learning programs.

Table 3. *Demographic Characteristics of Respondents*

Category	Characteristic	Number of Respondents	Percentage of Respondents
Gender	Male	113	53.56%
	Female	98	46.45%
Age	18-27 years old	79	37.44%
	28-37 years old	60	28.44%
	38-47 years old	54	25.59%
	48-57 years old	18	8.53%
Education	Higher Secondary School Certificate (H.S.C.)	22	10.43%
	Graduation	109	51.66%
	Post-Graduation	63	29.86%
	Others	17	8.06%
Profession	Student	78	36.97%
	Homemaker	19	9.01%
	Private Service	47	22.28%
	Government Employee	39	18.48%
	Entrepreneur	28	13.27%
Income	No Self-Income	13	6.16%
	Less than 10,000 Tk.	29	13.75%
	11,000 to 30,000 Tk..	116	54.98%
	31,000 to 60,000 Tk.	40	18.96%
	Above 61,000 Tk.	13	6.16%

Source: Authors Calculation

Table 4. *Discriminant Validity and Correlation Matrix*

Constructs	PU	PEU	HM	SI	SE	IU
PU	**0.851**					
PEU	0.615	**0.878**				
HM	0.638	0.625	**0.716**			
SI	0.664	0.590	0.518	**0.869**		
SE	0.593	0.567	0.643	0.778	**0.808**	
IU	0.671	0.631	0.701	0.625	0.572	**0.845**

Source: Authors Calculation

In Table 5, the goodness of fit indexes confirmed the model fits within the range; therefore, no items are extracted for hypothesis testing (Hair et al., 2014).

Table 5. Measurement Model Fit Index

Category	Name of Index	Index Value	Level of Acceptance
Absolute Fit	Chi-square or $\chi 2$ */df*	1.246	$\chi 2$ */df* < 3.0
	P-value	.005	P-value < 0.05
	RMSEA	.030	RMSEA < 0.08
	GFI	.967	GFI > 0.80
Incremental Fit	AGFI	.959	AGFI > 0.80
	CFI	.989	CFI > 0.95
	TLI	.987	TLI > 0.95
	NFI	.969	NFI > 0.90

Source: Authors Calculation

This study has integrated one mediating variable, examined through the Bootstrap method, presented in Table 6, showing the path coefficients of direct and indirect effects (Hair et al., 2014).

Table 6. *Results of the Hypotheses*

Hypotheses	Path		*p*	Comment
H1	PU → SE	.397 2	***	Supported
H2	PEU → SE	.490 1	.***	Supported
H3	HM → SE	.174	.067	Not Supported
H4	SI → SE	.285 6	.008	Supported
H5	PU → IU	.359 4	***	Supported
H6	PEU → IU	.381 3	***	Supported
H7	HM → IU	.082	.11	Not Supported
H8	SI → IU	.236 7	.010	Supported
H9	SE → IU	.347 5	***	Supported

******p-value<0.01, 0.05***

Source: Authors Calculation

Reasoning the coefficients of standardized regression weight in Table 6, H1, H2, H4, H5, H6, H8, and H9 are fully supported as the P-values are less than 0.005 ($p<0.005$) positively and significantly, apart from the insignificant P-values of H3 (.067>.01) and H7 (.11>.01), interpreting the features of Facebook groups with the mediating effect of students' engagement intensely enhancing intention-to-use the e-learning program on Facebook except the influence of enjoyment (see Figure 2).

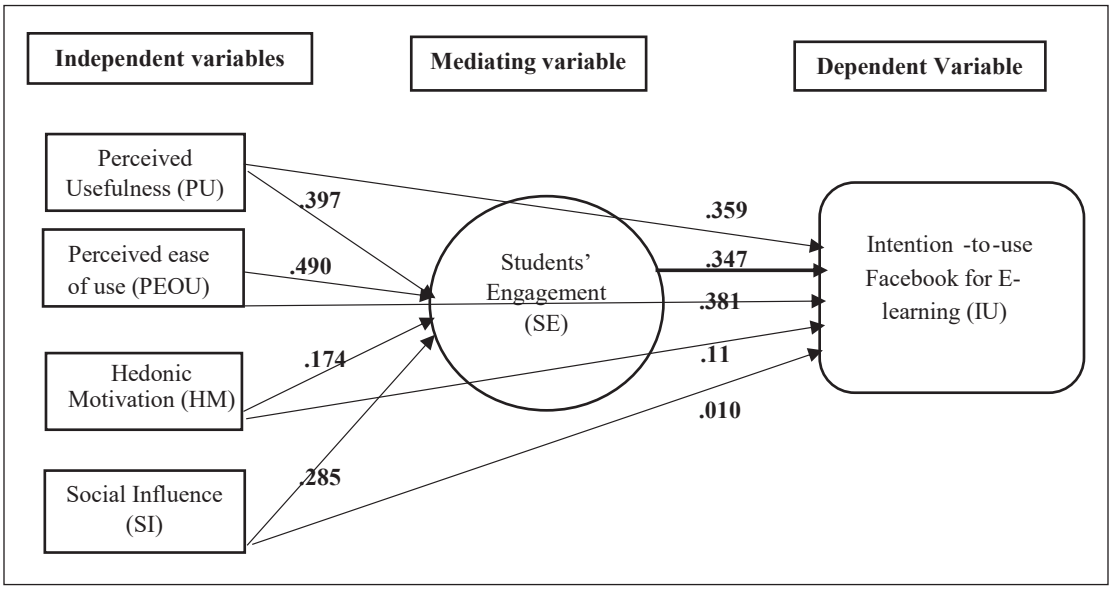

Figure 2. *Direct and Indirect Effects of Facebook Groups in Enhancing Students' Intention to Use E-learning Programs*
Source: Authors Developed

5. Discussion

To answer the first research question, SE as a mediator strongly positively enhances students' future use of e-learning programs impacted by the indirect effect of PU, PEOU, and SI, supporting the suitability of the TAM, UTAUT, and Students' Engagement (SE) theory for Facebook-based e-learning programs in higher education.

This study's findings validate that PEU, followed by PU, HI, H2, H5, and H6, has the highest and most positive direct effect on intention-to-use Facebook and a mediating indirect impact on SE towards e-learning. This is supported by the renowned academics, such as Aldreabi et al. (2025), Shkembi et al. (2024), Ullah et al. (2023), Alam et al. (2023), Obaid et al. (202), Moorthy et al. (2019), Sa'nchez et al. (2010), inferring that the students using Facebook groups in an e-learning program to accomplish tasks more quickly, also, students' interaction with Facebook groups is clear and understandable, including their engagement towards IU.

As hypothesized in H4 and H8, SI was the third-highest vital predictor affecting student engagement towards intention-to-use Facebook groups in e-learning. This is aligned with the past study of Maqableh et al. (2021), who revealed how Facebook's interactive features, such as comments, likes, and shares, upsurge one's social influence, and with m-learning adoption of Moorthy et al. (2019), Moghavvemi et al. (2017), and Moghavvemi and Janatabadi (2017). However, it is opposed to the findings of Tandon et al. (2022) on students' adoption of e-learning.

Moreover, to answer the second research question, SE as a mediator as reflecting H9, fully representing the mediating effect with the correlation of other four constructs regarding the intention-to-use e-learning on Facebook groups, similar with the findings of earlier studies (Evans and Zhu, 2023; Hoi and Hang, 2021; Yel et al, 2019; Khan and Bakhsh, 2015; Sim et al., 2014; Wang et al.; 2013; Lam, 2012), concluding that the students get the similar e-learning experience on educational Facebook groups.

Lastly, considering the insignificant results of HM, H3, and H7, it can be concluded that the students consider Facebook groups as a platform to enjoy their leisure time for socializing with networked friends, except for learning purposes. This corroborates the findings of other academics who examined HM on diverse LMS, such as Aldreabi et al. (2025) in Generative AI in Higher Education, Sitar-Tăut (2021) in m-learning, Wong and Wong (2016), Jong et al. (2014), and Yunus and Salehi (2012), and Cerdà and Planas (2011), who have inferred that Facebook is used for solid entertainment, not for educational hedonic motivation. Hence, this result is contrasted with the findings of Chaudhary and Kumar (2025), as they found that perceived sensory enjoyment as a form of HM, relationship, and assimilation determines student resistance to adopt e-learning systems' IU in universities achieving sustainable goals. Similarly, Alam et al. (2023) revealed that perceived fees are considered as the hedonic value on students' future e-learning adoption in South Asian Online Distance Learning (ODL) courses. Adding to this, Tandon et al. (2022) corroborated that developing countries' e-learning services encourage students' participation through HM, supported by Shkembi et al. (2024), Ullah et al. (2023), Sitar-Tăut (2021), and Moorthy et al. (2019) in mobile LMS and Tseng et al. (2014) in Online English Learning Resources (OELR).

Theoretically, this study presents evidence on the suitability of integrating the attributes from three models and theories: TAM (Davis, 1989), UTAUT (Venkatesh et al., 2003), and Student Engagement (Evans and Zhu, 2023; Hoi and Hang, 2021) to determine if the Facebook group can be utilized as an e-learning tool in higher education institutes or not. By extending these models and theories, the originality of this research lies in revealing the strong instructive influence of the determinants (PU, PEOU, SI) affecting students' future use of Facebook groups for e-learning programs, with the engagement level as a mediator in 'Meta.' The findings have directed e-learning admirers to focus on the powerful constructs, concepts, relevant theories, and models in an SNS perspective implied in the emerging country.

Practically, academic planners and advisors may encourage students' participation and interaction by integrating interesting user-friendly features of 'Meta' into Facebook groups, such as Reels, building culture, highlighting top contributors, etc. Considering the highest positive effect of perceived ease-of-use and perceived usefulness, if the students consistently experience task-accomplishment features, flexibly use the contents, and progress community relationships on Facebook from an e-learner expert, the future adoption of 'Meta' as a Facebook group may increase the adoption of new technology in the e-learning program. Suppose the e-learning program on Facebook may assist higher education students in accomplishing tasks faster and with an effortless use pattern. In that case, their engagement level will rise later, enhancing future use behavior. The educators and e-learning providers implement this study's finding that Facebook groups should be more enjoyable regarding e-learning engagement, instead of passing relaxation time while aiming for hedonic motivation. For example, institutional providers should form community relationships by stimulating course-based discussions and collaboration, exchanging educational resources, and ensuring students' voluntary support while sharing content. These participatory strategies lead the students' beliefs into connectedness rather than isolation, encouraging free teamwork in the subject matter, projects, or assignments.

Furthermore, the instructors may utilize user-friendly features, i.e., tagging all new members in a welcome post, assisting with Facebook live, virtual events, webinars, study-based contests, polls of Facebook groups to announce the daily course updates, distributing study handouts, and sharing video, audio, PDFs or other links posting at the peak time facilitating students' enjoyment in e-learning. If the students get instant replies regarding their group queries, their gratifying involvement in the e-learning content may increase. The group moderators or admins should recognize the active students' contributions by specifying members of the month through feature posts leveraging cross-promotion to boost intention-to-use.

6. Conclusion

This study intended to determine the mediating effect of students' engagement in using intentions in the e-learning programs on Facebook groups. The study reveals that perceived ease of use, usefulness, and social influence, except for hedonic motivation, increase students' intention to use Facebook groups for e-learning, with the indirect effect of engagement. These antecedents enhance the adoption of e-learning through Facebook groups in higher education, which is replacing the traditional means of virtual platforms and uplifting its popularity in e-learning education. The default algorithm and functional features integrating these attributes of Facebook provide the potential for group cohesion or interrelationship.

7. Recommendations

Future researchers should employ probabilistic simple random sampling, comparing other countries and varied age samples of social media: Instagram, YouTube, WhatsApp, and LinkedIn to reduce generalizability issues. Moreover, future academics should incorporate other variables and constructs accompanying diverse data analysis software, PLS-SEM, and LISREL, to examine the mediating or moderating variable, or qualitative methodology should be aligned. Why hedonic motivation is insignificant in the present research should be an interesting phenomenon to investigate in varied cultural settings on other SNSs.

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