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Revolutionizing education: unleashing the power of social media in Saudi Arabian public universities

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This study examines the influence of social media on learning and education inside higher education institutions in Saudi Arabia. This study attempts to utilize the e-learning acceptance model (e-LAM) in order to identify some of the variables that impact Saudi students' inclination to utilize social media for educational purposes at higher learning institutions in Saudi Arabia. The e-LAM draws on a number of different theoretical viewpoints in order to present a more comprehensive picture of the variables that encourage the use of social media in learning and education in Saudi Arabian higher education institutions while students are enrolled in universities. The study's survey was completed by 369 undergraduates' participants enrolled in various academic programs and different educational levels. With the use of structural equation modeling, the analysis was carried out in order to investigate the correlations that existed between the variables that were stated in the conceptual model. Social media adoption intentions in Saudi Arabian higher education institutions were found to be significantly related to performance and self, supporting hypotheses 3 and 4, while communication functionality (COM) and effort (E) were found to be not significant towards Saudi Arabian students' intentions to adopt social media, thus rejecting hypotheses 1 and 2.

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Introduction

The rapid development of technology and applications that run on the Internet has contributed to the proliferation of social media. These social media have been called an essential conduit for connecting individuals and sharing information, and both students and teachers have made use of the resources that they provide in this regard. People's ways of communicating with one another and interacting with one another have been altered as a result of the proliferation of social media in a society that is becoming more global. Students in institutions of higher education appear to be the social media users who contribute the most, and there are millions of people in every part of the global community who use social media on a regular basis. According to Xiao and Mou (2019), the growing popularity of such social media platforms (SMPs) can be attributed to the networks' convenience, flexibility, and functions. Therefore, it should not come as a surprise that social connection affects not only numerous elements of our day-to-day lives but also has the potential to be employed in the fields of education and learning (Manca, 2020). This indicates that the way in which students interact with instructors and other learners, as well as the way in which they acquire online content, has been affected as a result of their use of social media. It was estimated that there were 5.18 billion people using the Internet all over the world as of April 2023, which represented 64.6% of the total population of the entire planet (Petrosyan). According to Petrosyan (2023), 59% of the globe's population, or 4.8 billion people, are active on social media. In a similar vein, Nyst (2023) established that Facebook, YouTube, WhatsApp, Instagram, and WeChat were the top five most used social media sites, ranked by the number of global active users. This pattern has demonstrated that online social networking has developed into an extraordinarily significant communication medium in the modern era.

In regard to higher education, however, Tight (2021) reported that institutions of higher education have focused more of their emphasis on globalized forms of online education. An example of this would be the Saudi Arabian vision for higher education in 2023, which outlines transformational agendas that will result in outstandingly continued excellence in the context of higher education (www.vision2030.gov.sa). Consequently, it was estimated that there were 36.31 million users in Saudi Arabia who had access to the Internet at the beginning of the year 2023, which would indicate that the country's Internet penetration rate exceeded 99 percent. As of January 2023, the population of Saudi Arabia consisted of 29.10 million individuals who were active on SMPs. This figure represents 79.3 percent of the total population (Kemp, 2023). In accordance with Kemp (2023), Saudi Arabia presently maintains the second-highest broadband access rate in Asia, which is 67%. As a result, Saudi Arabia is in an excellent position to take advantage of digital learning platforms in order to support learning management systems that improve the overall quality of education and instruction. This shift in the blueprint has brought to light the significance of the learning management system since it places an increased emphasis on providing individualized educational opportunities for all students. This aligns with Saudi Arabia's Vision 2023, which advocates for enhancing the higher education system through the incorporation of technological innovations in education for the facilitation of learning (Al-Ghamdi, 2023). This is because technology may help students learn more effectively. According to Stack's (2021) research, students attending top-ranked colleges in the United States acknowledged that maintaining a constantly illuminated learning experience that gives them accessibility to learning materials whenever, wherever, and on whatever device they want is the most important educational experience for them. Furthermore, a separate survey conducted by Salem (2020) revealed that social media has transformed into a platform that facilitates informal yet interactive communication among students, potential students, instructors, and institutions of higher learning. Consequently, educators are employing several social networking platforms as professional and learning groups, facilitating the exchange of compelling content related to the topics that are being taught in classrooms. These materials may be found on the Internet. This indicates that the utilization of these technologies will promote flexible learning nearly everywhere across locations, which include the classroom, away from campus, and inside the workplace. As a result, social media has served as evidence that using social annotation, promoting active collaborative learning, and elevating students' achievement in higher education can all be accomplished through its use.

The use of social media has excessively increased globally during the last decade (Tandon et al., 2021). Speaking about Saudi Arabia, a study conducted by Radcliffe and Abuhmaid (2020), found that, per capita, Saudi Arabia is the world's fifth-largest Twitter market as well as the world's biggest YouTube user. This can be attributed to the fact that Saudi Arabia is experiencing an increasing proportion of the Youth population. As of 2020, the median age was 29.2 years of the Saudi Arabi population (O'Neill, 2023). In other words, half of the population in Saudi Arabia is younger than 29 years. In which, age is a demographic factor that has a positive impact on Internet usage (Porter and Donthu, 2006). Taking into consideration the youth population, Saudi Arabia is ranked second in the world in terms of high Internet penetration rate (Statista, 2020). In this, the majority of the population in Saudi Arabia is mobile Internet active users.

From the above, Saudi Arabia considers education as an integral part of its 2030 vision; however, it can clearly be seen that the usage of SMPs in Saudi Arabian higher education institutions is still in its infancy, and there is very little empirical evidence available on how it will affect students' ability to learn (Alshehri, 2022; Bin-Hady and Al-Tamimi, 2021). This is despite the fact that SMPs are extremely important in the modern world. However, there has been a dearth of data presented regarding the widespread acceptance of SMPs and their utility in educational settings, particularly in Saudi Arabia (Alshwiah and Alaulamie, 2022).

Although interaction in a learning environment through the use of the aforementioned instruments could not be conveniently established due to inadequate course design, this does not change the fact that the tools are quite useful. Moreover, Jang et al. (2021) emphasized that college and university instructors must possess media and information literacy skills in order to enhance their inclination to assist students in studying independently and seeking continuing education throughout their lives. This was expressed in the context of the requirement that university lecturers be literate in media and information. As a result, it is essential for institutions of higher education in Saudi Arabia to pay avid attention to the potential functions that social media can play. This is because social media was identified as one of the ways that facilitate and enhance learning in the education sector, which is why it has garnered increased research interest within academics and is regarded as something that is worth investigating. Specifically, the objective of this study is to evaluate the impact that the four essential components of the e-learning acceptance model (e-LAM)—self, efforts, performance, and communication functionality (COM)—have on the intent of undergraduate students to take advantage of SMPs for learning purposes. The participants will be drawn from higher education institutions in Saudi Arabia.

Therefore, the aim of this study is to explore the impact of social media on learning and education within higher education

institutions in Saudi Arabia. Using the e-LAM as a framework for analysis, the research seeks to investigate the various ways in which social media usage can influence the educational landscape in Saudi Arabian universities. Through an examination of the e-LAM variables, which include performance, self-efficacy, COM, and effort, the study aims to provide insights into how students' intentions to adopt social media for educational purposes are shaped. Ultimately, this research aims to contribute to a deeper understanding of the role of social media in enhancing learning outcomes and educational practices in the context of higher education in Saudi Arabia.

Literature review

As previously highlighted by Yusnanto and Wahyudiono (2023) and Basri and Siam (2019), social media is an online space that makes it possible for users to construct a profile that is publicly accessible or semi-public within a particular system, communicate with a list of other users within the framework, and at the same time allow other users to observe and intersect with one another within the same system. Social media is a technology that offers extremely interactive environments via which people from various backgrounds can share, co-create, discuss, and edit user-generated content by employing mobile and web-based technologies (Khan et al., 2023). It is believed that SMPs that include but are not limited to, LinkedIn, YouTube, Facebook, Twitter, Research Gate, and Google+ can be used as a means of instruction for teaching university courses (Amara et al., 2023; Adeola et al., 2022). This is because SMPs include embedded facilities that enable content generated by users based on the adaptability of Web 2.0 structures.

Do social media platforms influence students' intentions to learn? As a result of the enormous influence that SMPs have on the learning process, Muftah (2022) advocated the exploitation of these platforms as educational tools. It has also been observed by Stellefson et al. (2020) that both students and teachers have begun to employ online social networking platforms in order to interact with one another and share information. This is due to the fact that it has been demonstrated that students take pleasure in using SMPs in order to complete and improve their learning activities. This demonstrates that, with the opportunity to connect and cooperate between both professor and student, electronic communication tools are believed to have a considerably larger impact on this community in comparison to more conventional forms of educational delivery methods.

The widespread acceptance of SMPs like Facebook has led to an upsurge in the total quantity of interaction that takes place between learners and their educators. This is because Facebook provides a forum in which students and instructors may talk about future assignments and activities, as well as valuable links and student work samples. For instance, Habib et al. (2021) discovered that students in higher education institutions find it simpler to access information concerning course allocation, lecture venue, and assignment details; it also enables them to offer prospective topics they're interested in and allows them to discuss those matters with their instructor via Facebook.

In relation to social media in higher education, Twitter was also deemed a useful tool (Teng and Wang, 2021; Sleeman et al., 2020; Al-Harasi et al., 2021). The authors noted that it may engage teachers in discussions with students via discussion boards within a learning management system and via e-mail. This is due to the fact that Twitter was thought of as a useful medium for the creation of group knowledge, which enabled students to score better on quizzes. This is supported by Zhang et al. (2021) and Erarslan (2019) who found that students in the experimental group had significantly higher grades when they used Twitter. This is because it encouraged them to continue having conversations outside of class, provided a "low-stress" way for them to ask questions, reminded them when their assignments were due, helped them organize study groups, and encouraged them to work together. This emphasized the importance of social media, as all of these factors could significantly contribute to enhancing the student's grades and enabling a strong learning progression.

In addition, it was also discovered that YouTube is the social network that is referred to the most frequently in the field of education (Palla and Sheikh, 2021). It's possible that this is due to the fact that YouTube gives viewers the ability to upload, share, and evaluate videos, in addition to providing feedback. Two studies, one conducted by Palla and Sheikh (2021) and the other by Sakkir et al. (2020), came to the conclusion that YouTube is a useful resource for learners in higher education. This was due to the fact that university students were contented with their overall experience using YouTube, and they believed the videos on YouTube would allow them to have more individualized learning experiences.

According to Heydari and Teimourpour (2020), ResearchGate has quickly emerged as a go-to resource for instructors working with students of all ages and experience levels. ResearchGate is a social bookmarking site that enables users to produce, organize, and share the content of research work via the creation of index citations in Metrix. This is in contrast to other social networking sites, which offer individuals the opportunity to engage with one another and share information with one another. On the other hand, Research Gate allows users to link to a variety of online resources, including webpages, BibTeX, EndNote, RefMan, and RefWorks bookmarks, all of which are able to be located by other reference search engines. Greenhow and Galvin (2020) came to the opinion that academicians ought to incorporate SMPs within the educational and pedagogical activities that are carried out in higher educational institutions. Their conclusion has been reached as a direct consequence of the growing popularity of the World Wide Web and social networking sites.

In the context of social media and higher education, the events discussed above demonstrated the importance of effectively utilizing SMPs in higher education institutions, not only for the students but also, for the educators and educational organizations that seek to improve their education outcomes. The existing literature review revealed a consensus that social media is a significant tool for learning improvement. Also, it shows the need to investigate the influence of social media on learning and education in Saudi Arabian higher education institutions.

e-Learning acceptance model (e-LAM). For the purpose of laying the framework for the development of the e-LAM, which was eventually abbreviated to e-LAM (Trivedi et al., 2022), the unified theory of acceptance and use of technology (UTAUT) model was employed as the basis for the conceptual model (Cristina et al., 2019). e-LAM is used to assess the acceptance of e-learning among students in addition to lecturers. This evaluation necessitates taking into consideration several distinctive predictive factors, such as performance expectancy (which refers to perceived usefulness, interactivity, and flexibility), effort expectancy (which refers to ease of learning, perceived ease of use, and self-efficacy), social influence (which refers to subjective norm and image), and facilitating conditions (which refers to institutional support). Thus, e-LAM has been incorporated into this study, because it is claimed to be more complete in its ability to measure elements such as flexibility, interaction, and self-efficacy (Tarhini et al., 2016), all of which do not currently exist in UTAUT. The

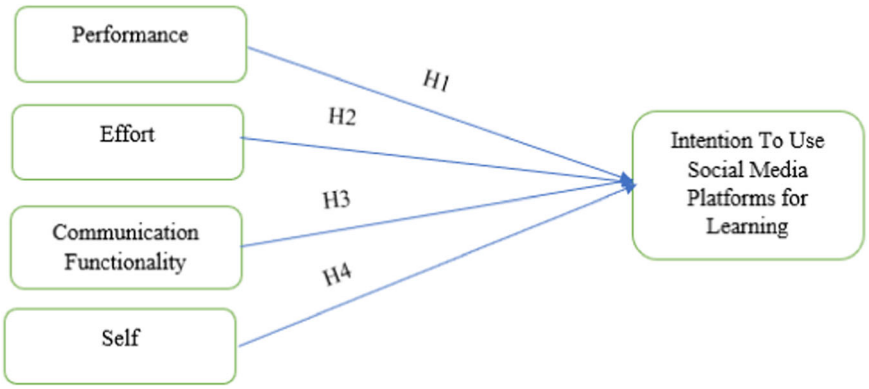

Fig. 1 The study model. Conceptual framework.

conceptual framework was built in order to address the research objectives, which can be found in Fig. 1.

The e-LAM, as described by Balakrishnan et al. (2015), encompasses a total of four predictive variables: performance (comprising perceived usefulness and perceived flexibility), effort (comprising perceived ease of use and perceived ease of learning), COM (encompassing collaboration, sharing, and interaction), and self (encompassing social media efficacy, attitude, and enjoyment). In this regard, the following hypotheses have been proposed:

i. *There is a significant relationship between Performance and students' intention to use social media platforms for learning in Saudi Arabia.*
ii. *There is a significant relationship between Effort and students' intention to use social media platforms for learning in Saudi Arabia.*
iii. *There is a significant relationship between Communication Functionality and students' intention to use social media platforms for learning in Saudi Arabia.*
iv. *There is a significant relationship between Self and students' intention to use social media platforms for learning in Saudi Arabia.*

Performance. In the context of the teaching-learning process, performance can be defined as the extent to which both the student and the educator are confident that they will benefit from the utilization of the system. Beliefs in one's own perceived usefulness and adaptability serve as the foundation for this predictor. The concept of "perceived usefulness" focuses on the extent to which learners as well as teachers anticipate that utilizing SMPs will improve knowledge, lead to higher accomplishment, and increase productivity while simultaneously reducing the amount of work required for studying and teaching. Based on the findings of Trivedi et al. (2022) and Twum et al. (2022), the level of performance of students exhibits a significant impact on their inclinations to take advantage of social media for educational reasons. This can be attributed to the fact that students' writing and reading comprehension abilities can be improved through the utilization of SMPs. The content found on SMPs does, in fact, meet the preferences of both students and teachers. In the study conducted by Kalam et al. (2023), it was discovered that the usage of social media substantially enhances both the level of engagement and semester grade point averages of students in higher education. As a result, it was revealed that performance has an important influence on a student's decision to use social media.

Effort. In the opinion of Thanomsing and Sharma, (2022), effort is defined as the degree to which students and instructors feel that SMPs require no work on their part. This leads them to assume that using these platforms is effortless. The findings of a study that was carried out by Trivedi et al. (2022) demonstrated that the influence of the students' peers at the institution did not have a significant impact on their propensity to take advantage of social media for educational purposes. This was due to the fact that university students are already familiar with social media, and it requires less effort on their part to use it. The findings suggest that SMPs have facilitated the acquisition of knowledge, and the extent to which users believe that SMPs are effective in predicting knowledge acquisition. Following a study conducted by Paiman and Fauzi (2023), it was observed that the level of effort exerted by higher learning students in Malaysia possesses an instantaneous effect on their desire to utilize YouTube as a platform for acquiring knowledge.

Communication functionality. Pitafi and Ren (2021) and Zhang et al. (2020) both point out that the communication features of SMPs make it easier to interact with one another and share information and resources, which is a great benefit for both learners and instructors alike. For example, Naeem (2019) and Naeem and Khan (2019) observed that Research Gate, LinkedIn, and WhatsApp indicate a collaborative approach to learning, the exchange of ideas, and a stress-free way to acquire learning materials. In addition, the study discovered that COM has a major impact on university students who consider themselves independent and collaborative in terms of their inclination to utilize social media for educational purposes. This indicates that university students can study and learn from their professors with a limited amount of direction, and they may also feel more at ease and find it simpler to engage with their peers via social media. Therefore, it is conceivable to say that social media has been proven to be an excellent platform for students to study, based on the data that Muftah (2022) has uncovered. This is due to the fact that it enables and lets university students have the opportunity to disseminate content connected to their courses (i.e., videos), whereas the bulk of the learning platforms that are now available do not place an emphasis on these elements. This is due to the fact that the vast majority of conventional learning platforms provide instructors with full control over the activities of posting and downloading the essential resources for learning.

Self. The three dimensions that makeup one's self are one's social media efficacy, attitude, and enjoyment of using social media. Muftah (2022) and Naeem and Khan (2019) established that one's sense of self can be related to the sensation of satisfaction that one has while using SMPs in a manner that is academically focused. This delight in using social media is mostly attributable to the usefulness of social media and the perspective of users with

regard to their use of social media. Hence, self-efficacy is a component that is assessed within oneself, which can be described as users' self-assessment of their proficiency in using SMPs, and it can also pertain to the extent of higher education students' confidence in their capacity to effectively leverage the use of social media for educational purposes. A recent study conducted by Kalam et al. (2023) showed that students who demonstrate enthusiasm and accountability towards their educational pursuits tend to engage more actively with SMPs, utilizing the aforementioned instruments during their learning activities. This stands in contrast to students who prefer working alongside other students. In addition, the results of this study have shown that the self is the factor that has the most influence on a university student's decision to use social media for educational purposes. Therefore, in order for pupils to achieve their full potential, it is extremely vital for there to be an element of fun in the learning process. This is because it allows the student to become enthusiastic, focused, and motivated to learn.

Methodology

This study indicates that the increasing number of well-educated individuals appears ready to have a significant impact on shaping global economic environments. The production of graduates by universities who possess significant skills and knowledge increases the potential for innovation and productivity improvements in several sectors. Thus, this study suggests that if university students are adequately educated with the use of advanced technology such as social media, they have the potential to drive substantial economic development in the near future. Therefore, a response from university students in Saudi Arabia was obtained utilizing a quantitative research design employing convenient sampling and snowballing techniques to augment the data collection process through an online questionnaire.

Despite the fact that the human rights of respondents must be protected by guidance and recommendations on survey instruments, such as maintaining the respondent's anonymity and confidentiality, the ethics of respondents present a significant difficulty for social scientists. This is due to the fact that respondents' human rights must be respected. This research notified all of the individuals who participated in the study about the goal of the investigation. Additionally, the participants were informed that the information that was acquired would be kept confidential and that the research would be carried out purely for academic purposes. Arabic was the language that the researchers used to communicate with those who participated in order to convey the study's aim and objectives during the process of collecting quantitative data.

The formulation of the research constructs was derived from existing literature, and bolstered by expert perspectives. The suitability of the research constructs has been verified by a two-step approach prior to conducting the data collection. First of all, one academic expert examines the research constructs, working on performance and students' intention (PSI), effort and students' intention (ESI), communication functionality and students' intention (CFSI), self and students' intention (SSI) and use of SMPs. Similarly, the pretesting questionnaire was done to test the study accuracy of the words, the flow of the questions, the longness of the questions, in terms of the number of questions per each research variable, and the time it takes to fill in one questionnaire and the scale of the questionnaire, etc.

Demographic profiles of the survey participants. The research technique involved a meticulously chosen group of 369 student participants, exclusively selected from public universities in Saudi Arabia. The decision was intentional, with the aim of guaranteeing a sampling frame that accurately represents the larger student population in the country. The decision to select public universities instead of private institutions was based on their greater accessibility and inclusivity, which was in line with the study's objective of encompassing a wide range of perspectives and experiences. In addition, public colleges frequently serve a larger and more diversified population, providing a wider range of possible participants. The study's objective was to increase the generalizability of the findings by specifically examining public universities and minimizing potential biases related to socio-economic position and educational background. Through the use of online questionnaires, the process of collecting data was made more efficient, allowing for the easy acquisition of valuable information while ensuring the confidentiality and convenience of participants. The careful technique employed in this study highlights the strong dedication to rigor and validity in the research design. Participants, irrespective of their academic program or geographical location, were requested to complete the online questionnaires. The survey targeted students enrolled in universities in Saudi Arabia, covering diverse educational levels such as Higher School, Diploma, Undergraduate, and Postgraduate programs.

Table 1 Demographic profiles of the survey participants.

Gender	Scale	Frequency	Percent
	Male	208	56.2
	Female	162	43.8
	Total	370	100
Education	**Scale**	**Frequency**	**Percent**
	Higher school	78	21.1
	Diploma	8	2.2
	Undergraduate	258	69.7
	Postgraduate	26	7
	Total	370	100

Table 1 presents the demographic profiles of the survey participants, offering valuable insights into their characteristics. The distribution of respondents based on gender and educational background is outlined in the table, providing a comprehensive view of the sample within the context of Saudi Arabian public universities.

Table 1 reveals that out of the 369 participants, 208 (56.2%) identified as male, and 162 (43.8%) identified as female. This gender distribution demonstrates a balanced representation, facilitating a thorough examination of the research topic across gender lines.

Regarding educational background, respondents were classified into four groups: Higher School, Diploma, Undergraduate, and Postgraduate. The majority of participants, 258 (69.7%), were enrolled in Undergraduate programs, indicating a focus on capturing the perspectives of undergraduate students. Additionally, 78 (21.1%) participants were from Higher School, 8 (2.2%) from Diploma programs, and 26 (7%) from Postgraduate programs, presenting a diverse representation of educational levels.

The demographic profiles in Table 1 highlight the inclusive nature of the study, encompassing participants from various educational stages and gender identities. The presence of diverse participants in this study allows for a more thorough analysis of the effects of social media on learning in the higher education system of Saudi Arabia, increasing the applicability of the findings. The equitable representation of both genders enhances our comprehension of the potential variations in social media uptake and usage among different demographic cohorts.

Scales measurement. This study employed the e-LAM to evaluate the key technological objectives related to the articulation and

Table 2 Construct validity and reliability.

Constructs	Items	FA	CA	CR (rho_a)	CR (rho_c)	AVE
Use of social media	BI1	0.90254	0.95572	0.95649	0.96582	0.84967
	BI2	0.93258				
	BI3	0.93777				
	BI4	0.92438				
	B15	**Deleted**				
	BI6	**Deleted**				
	BA7	**Deleted**				
	BI8	**Deleted**				
	BI9	0.91115				
Communication functionality	COM1	0.85695	0.93477	0.93786	0.94864	0.75515
	COM2	0.89743				
	COM3	0.89198				
	COM4	0.89007				
	COM5	0.88163				
	COM6	0.79125				
Effort	E1	0.78227	0.79108	0.80472	0.86252	0.61103
	E2	0.81816				
	E3	0.79121				
	E5	0.73267				
	E4	**Deleted**				
	E6	**Deleted**				
Performance	P1	0.72719	0.90226	0.91807	0.92506	0.67427
	P2	0.78662				
	P3	0.77006				
	P4	0.92124				
	P5	0.85686				
	P6	0.8498				
Self	S1	0.81661	0.90725	0.90754	0.93105	0.72992
	S2	**Deleted**				
	S3	0.84438				
	S4	0.88145				
	S5	0.8522				
	S6	0.87553				

Factor loading (FL), Cronbach's alpha (CA), composite reliability (rho_a), composite reliability (rho_c), and average variance extracted (AVE).

utilization of SMPs. The scale utilized comprises 37 items representing PSI, ESI, CFSI, SSI, and the use of SMP. This scale aimed to assess users' intention to adopt modern technologies based on their underlying motivation.

A validity assessment of the scale in this study was conducted using average variance extraction (AVE). Convergence efficiency confirmation relied on the examination of the AVE value, meeting or exceeding the threshold of 0.5, in line with Baharum et al. (2023); Al-Mamary et al. (2019); & Al-Mamary and Abubakar (2023) recommendations. Moreover, the evaluation of discriminant validity and the utilization of the heterotrait-monotrait (HTMT) criterion, supported by empirical data, demonstrated the measurement of correlations between distinct constructs. This analysis indicated that the estimated discriminant validity for the correlation between inter-structures was lower compared to the square of the average threshold. Therefore, these measures suggest the framework's significance when employing statistical analyses to determine a moderate impact of composite reliability and Cronbach's alpha, as presented in Table 2.

Data analysis. The partial least squares (SmartPLS 4.0) technique is a multiple-variable analysis tool that is based on structural equation modeling, thus studying it to analyze the collected data. Further to that, SmartPLS 4.0 has the advantage of not requiring the distributional assumptions that other approaches have. This means that the implementation of the partial least squares (PLS) methodology enables a direct evaluation of the authenticity of the individual components employed inside the system. For that, to construct a comprehensive structural model for each manifest variable (MV), this PLS analysis involves an initial step of simplifying and evaluating the chosen methodology, which shows the results of several predictive indices, Moreover, the evaluation of discriminant validity and the utilization of the HTMT criterion, supported by empirical data, demonstrated the quantification of connections between distinct constructs.

Therefore, in order to examine the structure that is being utilized, the parameters of a certain tangent point are analyzed for the exact purpose of accomplishing this particular target. According to Husin (2022) and Dolinting and Pang (2022), the following criteria should be satisfied: (a) the loading of manifest variables (MV) should be greater than 0.50; (b) the average variance extracted (AVE) should be greater than 0.5; (c) the reliability of items per construct should be greater than 0.5; and (d) Cronbach's alpha (A) should be greater than 0.70. The Breusch-Pagan test has been used to determine whether or not heteroscedasticity is present in the observations, as well as to confirm that heteroscedasticity is not present in the findings of the data.

Table 2 presents the results of the data analysis, focusing on construct validity and reliability using the e-LAM to assess the primary technological objectives related to the utilization of SMPs in Saudi Arabian universities. The table includes various indices such as factor loading (FL), Cronbach's alpha (CA), composite reliability (rho_a), composite reliability (rho_c), and average variance extracted (AVE) for the constructs related to the use of social media, COM, effort, and performance. Moreover, the table provides a comprehensive breakdown of the individual components

Table 3 Measurement of the model fit structural index.

	Saturated model	Estimated model
SRMR	0.052787877	0.052787877
d_ULS	0.978082545	0.978082545
d_G	0.470926253	0.470926253
Chi-square	987.3146918	987.3146918
NFI	0.881655416	0.881655416

within each category, including "utilization of social media," "communication capabilities," "exertion," and "achievement," along with their respective factor loadings. Factor loadings quantify the degree of association between each item and its underlying construct. High factor loadings indicate the presence of multicollinearity, which signifies a robust association between the items and their corresponding constructs, implying that the items effectively measure the intended ideas.

The reliability metrics Cronbach's alpha (CA) and composite reliability (rho_a and rho_c), displayed in Table 2, evaluate the internal consistency of the items within each construct. This demonstrates that elevated values of Cronbach's alpha and composite reliability suggest a strong correlation among the items within a construct, consistently measuring the same underlying concept. This indicates that the constructs are dependable and internally coherent in capturing the intended elements of social media usage and the acceptability of e-learning.

The AVE values that are presented in Table 2 are a representation of the amount of variance that is captured by the items with respect to the constructs that they influence. This means that higher AVE values indicate that the items within a construct explain a larger proportion of the variance in the construct, demonstrating convergent validity. AVE values above 0.5 are generally considered acceptable, indicating that the items effectively measure their intended constructs (Mutahar et al., 2022; Abdulrab et al., 2022).

The findings showcased in Table 2 substantiate the soundness and dependability of the measuring methodology employed in the investigation. The strong factor loadings, high Cronbach's alpha, reliable composite reliability, and significant AVE values demonstrate that the constructs and their corresponding items accurately represent the essential elements of the e-LAM in the specific context of using social media for educational purposes among undergraduate students in Saudi Arabian universities. The data analysis in Table 2 demonstrates the durability of the measuring model, confirming the accuracy and consistency of the constructs and their items in evaluating the desire to utilize SMPs for educational objectives.

Model measurement index. The model fit indices (Table 3) were used to assess the overall fit of the model before analyzing the analytical hypotheses. The indices of the final proposed model showed a strong correlation with the PLS results of the three models, which are the full model and the split model. The standardized root mean square residual (SRMR) is commonly used to assess these indicators. A SRMR score below 0.08 indicates a satisfactory level of correspondence. The SRMR score for the overall model was 0.04, which is below the acceptable threshold of 0.08. The models reveal an acceptable level of agreement between the empirical and theoretical covariance matrices.

The study determines the correlation between variables in terms of their values and how significantly they differ from one another. The variance of the R^2 coefficient was investigated in order to determine the extent to which it could explain the whole contribution of the independent variable to the variable that was being studied (the dependent variable). For the purpose of conducting an analysis of hypotheses H1–H4, the bootstrapping method was successfully applied. The results regarding the significance of the factor loading for each anticipated construct are presented in Table 2 and Fig. 2, respectively. The cumulative variance, denoted as R^2, is determined to be 40.4% of the variability observed in the students' intentions to use SMPs within Saudi Arabia. Nonetheless, there exist two antecedents in this context, namely PSI and SSI have a significant impact on influencing the intent of Saudi Arabian students to use social media. Furthermore, the study revealed that "Self" exerted a greater impact on students' intentions to use social media, accounting for 88% of the variance. Conversely, "Effort" and "Communication Functionality" do not have a significant influence on the use of SMPs in Saudi Arabia.

The e-LAM and its components serve as the foundation for the measuring model that was utilized in the research project, which is depicted in Fig. 2. In the context of Saudi Arabian higher education institutions, the purpose of the conceptual research model is to evaluate the relationships between the key constructs of performance, effort, COM, and self, as well as the impact these relationships have on students' intentions to use SMPs for educational purposes.

The first construct, which is performance, encompasses perceived usefulness and perceived flexibility, a reflection of the extent to which students and teachers believe that the utilization of SMPs will improve the teaching and learning process. It focuses on the anticipated benefits of using social media for educational purposes, such as improved knowledge, achievement, and productivity.

The second construct, referred to as effort, is associated with the perceived ease of usage and perceived ease of learning. It measures the amount to which students regard utilizing SMPs as effortless and beneficial to their learning experiences. It addresses the ease of utilizing social media for educational activities and its impact on students' intentions.

The third construct, which is referred to as COM, encompasses the concepts of collaboration, sharing, and engagement. It emphasizes the significance of SMPs in terms of their role in fostering interpersonal connections and interaction between students and teachers. This highlights the significance of communication elements inherent to SMPs in terms of their ability to promote educational activities and encourage involvement.

Students' self-perceptions and attitudes about using social media for educational reasons are the primary focus of the fourth construct, which is referred to as the self. This construct contains concepts such as social media efficacy, attitude, and enjoyment. The students' self-assurance in their ability to use social media, their attitudes regarding its utilization, and the fun that may be garnered from connecting with SMPs for educational purposes are all things that are addressed.

A thorough framework for analyzing the elements that influence students' intent to utilize SMPs for educational purposes is provided by the measuring model that is depicted in Fig. 2. Through the incorporation of several aspects, including performance, effort, COM, and self-perceptions, the model provides a comprehensive perspective on the elements that are responsible for molding the attitudes and actions of students with regard to the utilization of social media in educational settings. When it comes to analyzing students' intentions to use SMPs for educational purposes, the model emphasizes the multifaceted nature of social media adoption in educational settings and emphasizes the significance of taking into consideration a variety of aspects, such as perceived benefits, ease of use, communication features, and individual attitudes.

Thus, the measurement model in Fig. 2 serves as a valuable tool for assessing the complex interplay between different constructs

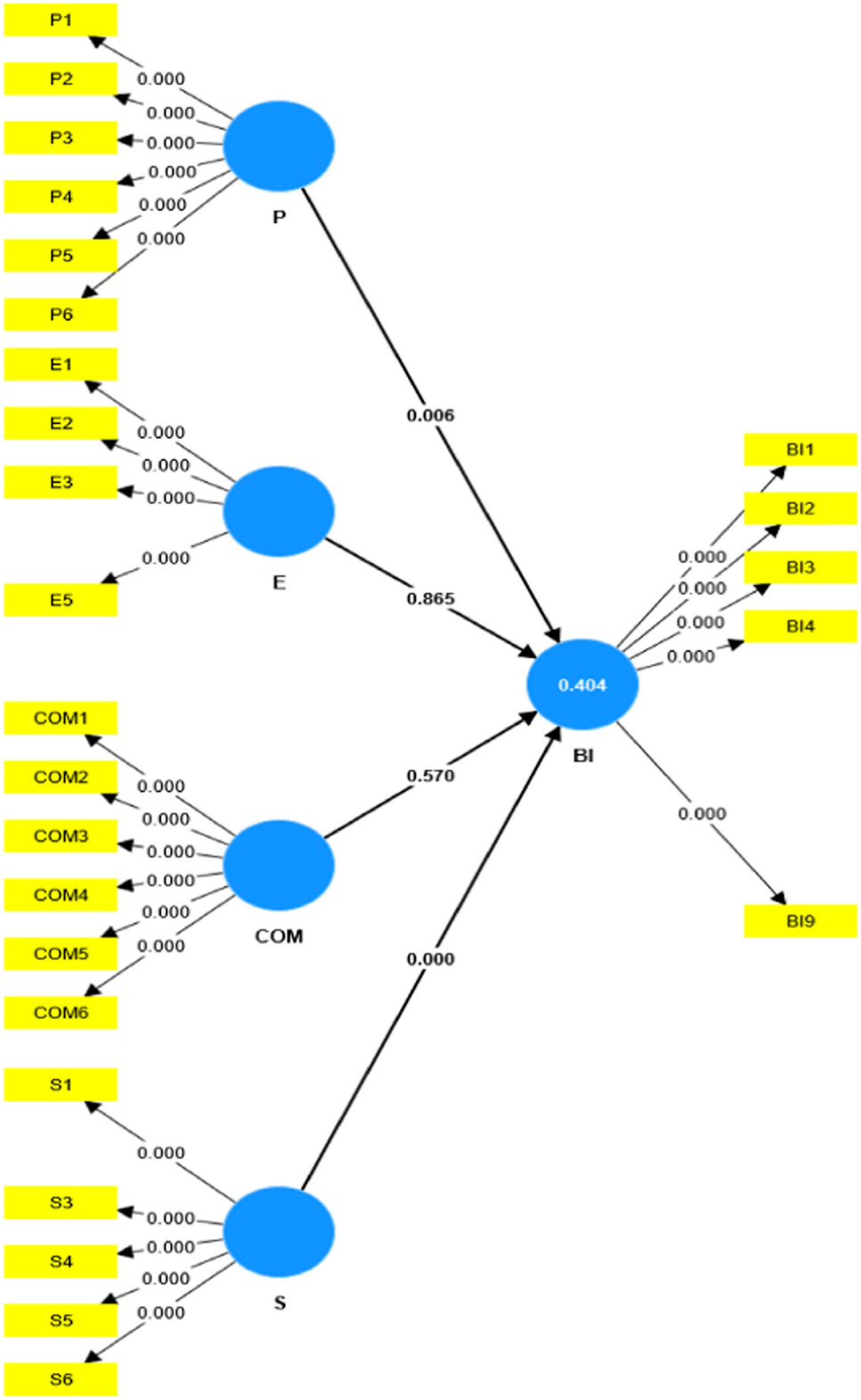

Fig. 2 Measurement model. Self (S), communication functionality (COM), effort (E), and performance (P).

and their influence on students' intentions to utilize SMPs for educational purposes within the context of Saudi Arabian higher education institutions.

Convergent validity. For the purpose of determining whether or not the conceptual model possesses discriminant validity, this investigation applied a procedure that consisted of two stages. The purpose of this evaluation is to determine the degree to which every construct in the model exhibits a distinctive characteristic that sets it apart from the other components of the model. In relation to the correlation of other constructs that were included in the model, the Fornell-Larcker criterion and the

Table 4 Discriminant validity of the total sample (Fronell-Larcker criterion).

	BI	COM	E	P	S
BI	***0.921777***				
COM	0.509091	***0.868996***			
E	0.382844	0.598022	***0.781686***		
P	0.536351	0.743046	0.541984	***0.82114***	
S	0.613778	0.710197	0.567326	0.676485	***0.854353***

Diagonal bolded and Italic values show the square root of AVE.

Table 5 Discriminant validity of the total sample (HTMT 0.90 Criteria).

	BI	COM	E	P
COM	0.537541			
E	0.42873	0.676077		
P	0.568381	0.808299	0.627577	
S	0.658606	0.771984	0.65027	0.745006

square root of the average variance extracted (AVE) for each latent variable were found to be significant. It was Rasoolimanesh (2022) who came up with the idea for the HTMT, and it required calculating the ratio of the correlations that existed between the various constructs to the correlations that occurred inside each construct. Hence, Tables 4 and 5 present the discriminant validity results. The values that are found in the diagonals of Table 4 for all of the different constructions have significantly greater values than the values that are found in the rows and columns. In addition to this, all of the HTMT values presented in Table 5 for the various constructions are lower than the cutoff value of 0.90 which is recommended by Cheung et al. (2023).

The findings of the Fornell-Larcker criterion, which is utilized to evaluate the discriminant validity of the constructs in the measurement model, are presented in Table 4. Assessing the degree to which each individual construct in the model contains a distinctive characteristic that sets it apart from the other components of the model is what is meant by the term "discriminant validity." Comparing the square root of the average variance extracted (AVE) for each construct with the correlations of that construct with other constructs in the model is the basis for the Fornell-Larcker criterion. This criterion determines whether or not a construct is significant. It is possible to determine, with the assistance of the criterion, whether each construct shares a greater amount of variance with its indicators than it does with other constructs in the model. There is a correlation matrix presented in Table 4, and the diagonal elements of the matrix indicate the square root of the average variance extracted for each construct. Off-diagonal components are used to illustrate the correlations that exist between the various constructs that are included in the model. Each construct's diagonal values are the square root of the AVE, and they reflect the diagonal values. These numbers represent the proportion of the construct's variance that is shared with its indicators in comparison to the proportion of variance that it shares with other aspects of the construct. Higher diagonal values suggest stronger discriminant validity for the respective constructs. The off-diagonal values represent the correlations between different constructs. These values are compared with the diagonal values to assess discriminant validity. A stronger discriminant validity is shown by off-diagonal values that are lower in comparison to the diagonal values. This is because these values suggest that the construct shares more variance with its indicators than it does with other constructs in the model.

A better understanding of the discriminant validity of the constructs in the measuring model can be gained from the findings of the Fornell-Larcker criterion, which are presented in Table 4. Consequently, this indicates that the criterion assists in determining whether each construct in the model is distinct from the others by comparing the diagonal values (square root of AVE) with the off-diagonal values (correlations with other constructs). The Fornell-Larcker criterion, which is shown in Table 4, provides evidence for the discriminant validity of the constructs that are included in the measurement model. This criterion indicates that each construct exhibits a distinctive property that distinguishes it from the other components included in the model. This further suggests that the measurement model effectively captures distinct dimensions related to performance, effort, COM, and self-perceptions without significant overlap between the constructs.

The results of the HTMT criterion are presented in Table 5. This criterion is utilized to evaluate the discriminant validity of the individual constructs that are included in the measurement model. Assessing the degree to which each individual construct in the model contains a distinctive characteristic that sets it apart from the other components of the model is what is meant by the term "discriminant validity." To fulfill the requirements of the HTMT criterion, one must ascertain the proportion of the correlations that exist between the various constructs to the correlations that are present within each construct. In order to determine whether the constructs in the model are unique from one another and whether they share a greater amount of variance with their indicators than they do with other constructs, this criterion enables an evaluation to be carried out.

A matrix of HTMT values is presented in Table 5. These values represent the ratios of the correlations between various constructs to the correlations that exist within each construct. There is a comparison made between the HTMT readings and the recommended cutoff value of 0.90. Values that are lower than 0.90 imply that the discriminant validity is stronger, which suggests that the constructs are unique from one another and share more variance with their indicators than they do with other constructs in the model. A better understanding of the discriminant validity of the constructs in the measuring model can be gained from the findings of the HTMT criterion, which are presented in Table 5. The criterion assists in determining if each construct in the model is distinct from the others by comparing the values of the HTMT with the proposed cutoff value.

The HTMT criterion in Table 5 supports the discriminant validity of the constructs in the measurement model, indicating that each construct possesses a unique quality that sets it apart from other components in the model. This suggests that the measurement model effectively captures distinct dimensions related to performance, effort, COM, and self-perceptions without significant overlap between the constructs. Furthermore, the HTMT results presented in Table 5 provide further support for the discriminant validity, demonstrating that the constructs in the measurement model are separate and do not have considerable overlap, thereby ensuring confidence in the different nature of the underlying dimensions being assessed.

The results of the hypothesis testing in the structural model are presented in Table 6. This model investigates the relationships between the key constructs of performance, effort, COM, and self, as well as the impact these relationships have on students' intentions to use SMPs for educational purposes within the context of Saudi Arabian higher education institutions. Standardized path coefficients, which describe the strength and direction of the links between the constructs, are used to show the results. These coefficients are reported in terms of the results. When the coefficients are larger, it indicates that the relationships between the constructs are stronger. The primary objective of this study is

Table 6 Hypotheses testing in structural model.

S/n	Hypothesis	Original sample (O)	Sample mean (M)	Standard deviation (std dev)	*T* statistics (|O/STDEV|)	*p*-values	Status
H1	COM→BI	0.042	0.045	0.075	0.568	0.570	Rejected
H2	E→BI	−0.009	−0.005	0.053	0.17	0.865	Rejected
H3	P→BI	0.205	0.203	0.075	2.74	0.006	Accepted
H4	S→BI	0.45	0.449	0.072	6.228	0.000	Accepted

Significant standards: *t*-value > 1.96. Self (S) communication functionality (COM), effort (E), and performance (P).

to investigate the connections that exist between the components of the e-LAM and the intention of undergraduate students in Saudi Arabia to make use of SMPs for educational purposes. The standardized path coefficients, *t*-values, and *p*-values for each hypothesis that was tested are shown in the table. The table provides an overview of the four hypotheses that were offered in the research project. These hypotheses investigate the correlations that exist between the variables that make up the e-LAM and the intention to utilize SMPs for educational purposes.

Specifically, the standardized path coefficients for each hypothesis were analyzed. These coefficients are a representation of the strength and direction of the relationship that exists between the constructs. The absolute values of the route coefficients range from −1 to 1, with higher values suggesting stronger, more significant associations. With positive values showing a positive relationship and negative values suggesting a negative relationship, the sign that indicates whether the relationship is positive or negative reflects the direction in which the relationship is moving. The values of the *t*-values and *p*-values each provide an indication of the statistically significant nature of the relationships that exist between the constructs themselves. *T*-values that are more than 1.96 and *p*-values that are less than 0.05 suggest that the correlations remain statistically significant at the 95% confidence level. The *t*-values represent the significance of the relationships between the constructs. Higher *t*-values indicate stronger evidence of significant relationships between the constructs, while on the contrary, the *p*-values represent the level of significance of the relationships between the constructs. And by extension, lower *p*-values for H3 (0.006) and H4 (0.000) indicate stronger evidence of significant relationships between the constructs; as such, both H1 and H2 are accepted, while H1 and H2 are rejected because of higher *p*-values.

Evidence of the significant correlation between the constructs of the e-LAM and the intention to utilize SMPs for educational purposes was reported by the findings of the study, which was conducted among undergraduate students in Saudi Arabia. To be more specific, the findings lend credence to the hypotheses (H3 and H4) that performance and "self" have a substantial positive link with the intention to use SMPs for educational purposes. On the other hand, the hypothesis (H1 and H2) that the intention to utilize SMPs for learning is significantly related to the amount of effort and COM involved was not confirmed.

Therefore, the findings indicate that students' intents to utilize SMPs for educational purposes in the setting of Saudi Arabian higher education institutions are significantly influenced by their performance as well as their sense of "self." Specifically, the findings suggest that students' self-perception and performance have a more significant influence on their intentions to use SMPs. This is because these two factors account for 88% of the variance in the data. On the other hand, students' efforts and the functioning of their communication do not have a major impact on their usage of SMPs. This indicates that the testing of hypotheses gives evidence of the linkages between the dimensions in the measuring model and shows the need to take into consideration the role of individual aspects such as performance and self-perceptions in relation to the utilization of social media in educational settings. Based on the findings, it is recommended that interventions that are designed to encourage the utilization of SMPs for educational purposes concentrate on improving students' performance as well as their self-efficacy attitudes toward the utilization of social media by university students. In conclusion, the study's findings offer valuable insights into those factors that influence the intention to use SMPs for educational purposes when it comes to undergraduate students in Saudi Arabia. These findings also highlight the significance of performance and self in shaping students' attitudes regarding the utilization of social media for educational purposes.

Discussion

This study evaluates the influence of the essential elements of the e-LAM on the intentions of undergraduate students attending Saudi Arabian higher education institutions to make use of SMPs for educational purposes. The research was conducted using a quantitative research approach, and the data was obtained through the use of an online questionnaire from a selected group of 369 participants who were taken from a wide range of academic programs.

There is a dearth of empirical information regarding how the use of social media impacts students' ability to learn, according to the findings of the study, which suggests that the use of social media in Saudi Arabian higher education institutions is still in the early stages of development. The study, on the other hand, sheds light on the potential roles that SMPs can play in facilitating and increasing learning within the educational sector. Effort and COM did not have a significant influence on students' plans to use SMPs for educational purposes, according to the findings of the study. Performance and self-esteem were shown to have a substantial impact on students' intentions to use SMPs for educational purposes. The research makes a contribution to the existing body of literature concerning the utilization of social media in educational environments, specifically with regard to Saudi Arabian educational institutions of higher learning. Based on the findings, it is recommended that initiatives that are designed to encourage the utilization of SMPs for educational purposes concentrate on improving students' performance as well as their self-efficacy attitudes toward the utilization of social media.

The study, as a result, offers insights into the possible functions of social media in the education sector, particularly in the context of Saudi Arabian higher education institutions, when it comes to facilitating and boosting learning capabilities. Based on the findings, it is recommended that interventions that are designed to encourage the utilization of SMPs for educational purposes concentrate on improving students' performance as well as their self-efficacy attitudes toward the utilization of social media. This research makes a significant contribution to the existing body of literature on the utilization of social media in educational environments and emphasizes the significance of taking individual aspects into account when encouraging the utilization of social media for educational purposes.

The issues addressed in the study, such as the impact of social media on learning and education, the utilization of the e-LAM for analysis, and the examination of variables like performance, self-efficacy, COM, and effort, contribute significantly to the learning

and teaching process in higher education institutions. For example, by exploring the potential impact of social media on learning, educators can leverage these platforms to enhance student engagement and participation in the learning process. This can lead to a more interactive and dynamic learning environment. Understanding how social media influences educational practices can help educators tailor their teaching methods to better align with students' preferences and learning styles. This, in turn, can lead to better learning outcomes and academic performance.

Furthermore, utilizing the e-LAM provides a structured framework for analyzing the adoption of social media in education. This can help educators make informed decisions about integrating technology into their teaching practices. This is because by examining the e-LAM variables like performance, self-efficacy, and COM, educators can personalize the learning experience for students. This individualized approach can cater to diverse learning needs and preferences, leading to a more effective teaching process.

Therefore, by gaining insights into students' intentions to adopt social media for educational purposes, educators can continuously improve their teaching strategies and adapt to learners' evolving needs. This iterative process of improvement contributes to the overall quality of the learning and teaching experience. By leveraging technology, understanding student motivations, and enhancing educational practices in higher education institutions, these issues contribute to a more engaging, personalized, and effective learning and teaching process.

Conclusion

In conclusion, the utilization of the e-LAM in this study has served as a lens through which to examine the intricacies of adopting social media within the higher education landscape of Saudi Arabia. Through the application of e-LAM, this study has unearthed invaluable insights into the multifaceted factors influencing students' willingness to embrace SMPs for educational purposes.

The findings of this research illuminate the correlations among key variables such as academic performance, self-efficacy, COM, and effort, shedding light on their profound impact on university students' intentions regarding the adoption of social media in an educational context. Hence, by unraveling these correlations, educators and policymakers are equipped with a deeper understanding of the dynamics at play, enabling them to craft more targeted and effective strategies for integrating social media into the educational framework of Saudi Arabia and the Arab culture at large.

Beyond mere academic discourse, this study holds tangible implications for the enhancement of the learning experience and outcomes within higher education institutions. By bridging the gap between theory and practice, the outcome of this study offers actionable insights that have the potential to reshape educational practices and empower university students in their pursuit of knowledge.

In essence, this study not only enriches the existing body of knowledge on e-learning and social media but also serves as a catalyst for meaningful change within the educational landscape of Saudi Arabia and the Arab culture, which underscores the importance of adapting pedagogical approaches to meet the evolving needs of students in an increasingly digital age, by paving the way for a more engaging, inclusive, and effective educational experience for all.

Data availability

The data that support the findings of this study are available on request from the corresponding author, [YH]. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

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Author contributions

Conceptualization: MM, YH, and AA; methodology: AA; resources: MM, YH, and AA; data curation: MM, YH, and AA; data collection and data analysis: MM, YH, and AA; writing—original draft preparation: MM, YH, and AA; writing—review and editing: MM, YH, and AA; supervision: YH; project administration: MM; funding acquisition: MM, YH, and AA. All authors have read and agreed to the published version of the manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Research Ethics Committee (REC) at the University of Hail dated:29/4/2024, no.H-2024-295.

Informed consent

Informed consent was obtained from all participants before the data were collected. We informed each participant of their rights, the purpose of the study and to safeguard their personal information.

Additional information

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