Understanding LMS Use in Saudi Higher Education: A Case Study of Blackboard at King Abdulaziz University

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Blackboard is the most recognized integrated e-learning management system. It has been proven especially during the COVID-19 pandemic when all businesses shifted online. It manages the educational process synchronously and asynchronously and provides a safe learning environment for students and faculty. This survey-based study aims to understand the use of learning management systems (Blackboard) among higher education students and faculty at King Abdulaziz University (KAU) by exploring different aspects of the system features and determining whether mobile devices and social media influence the use of Blackboard. The findings confirm the importance of improving the quality of LMS already in use by providing more knowledge about effective utilities of LMS tools and technical support for LMS use with mobile devices. Furthermore, this study validates the importance of making the most of LMS, especially in situations like the COVID-19 pandemic. The study's implications indicate a positive correlation between mobile blackboard use and social media if solely used for the learning process rather than for distractions.

Keywords: blackboard features, e-learning system, learning management system, mobile use context, social media platforms

INTRODUCTION

Distance education and online training programs have entered education like other life fields. Information and Communication Technologies (ICT) have enabled higher education institutions to adopt many technologies to improve learning efficiency (Burden & Kearney, 2016). The online learning environments in Saudi Arabia have flourished rapidly due to the development of telecommunication services, the widespread use of mobile devices, and the health status due to COVID-19 (Crompton, et. al., 2017). Nowadays, it is normal to use technology to deliver lectures and conduct e-exams. Learning Management Systems (LMS) have been the most popular technology for facilitating e-learning (David & Schwaninger, 2021). They are considered the most commonly used technology in the field of education (Gokbulut, 2020). The credit goes to the accessibility and availability of ICT (H.-Alcaide, et. al., 2020). LMS has been adopted

internationally in educational institutions (Alghazi, et. al., 2020). In the context of Saudi Arabia, most Saudi higher educational institutions (87%) have adopted LMS, where Blackboard is the dominant system (Shujah, et. al., 2019). However, the utilization of LMS in Saudi Arabia is minimal because of faculty' attitudinal barriers, irrespective of the support provided by the institutions towards such technology (H.-Alcaide, et. al., 2020; Plass, et. al., 2010). This study explores the role of LMS (Blackboard) and the actual use of LMS features within the context of King Abdulaziz University (KAU). Since many studies have concluded that Saudi students use e-learning systems ineffectively (Pop, 2014; Al-Jarf, 2020). It is necessary to identify the challenges they face to cater them in the future for effective use of LMS. Furthermore, it is critical to consider the obstacles facing the instructors and students while using the system tools.

E-learning procedures are still being adopted in most developing countries, so there are technical hurdles for instructors and students. For instance, poor network infrastructure, lack of ICT knowledge, lack of ability of students to fully participate in virtual classrooms, and deficiency in content delivery by the faculty are all the dominating factors (Andersson, 2008; Aung & Khaing, 2015). Furthermore, it demands instructors to assist the students and develop innovative ways of remote learning. This study investigates how students and faculty use Blackboard in Saudi Higher Education by evaluating the current practice of KAU online LMS in Jeddah. Thus, the objective of this paper is to answer the following research questions:

RQ1 *How do students and faculty use Blackboard? Which features do they use efficiently, and which do they struggle with?*

RQ2 *How do mobile devices affect blackboard use?*

RQ3 *What role does social media play in supporting learning?*

The structure of this paper is organized as follows: First, a literature review highlighting the related work is presented in Section II. Next, Section III discusses the research methodology and the data analysis, followed by Section IV presenting the study's findings. Section V discusses the results. Finally, Section VI concludes the whole work and provides some future directions.

RELATED WORK

E-learning integrates faculty, students, and the learning environment and provides support for anywhere learning for anyone. However, the effectiveness of e-learning methods strongly depends on students' and faculty' perceptions regarding online learning tools and individuals' attitudes toward social interaction with faculty and peers (Kreijns, et. al., 2003).

While using technological tools for learning, the instructor's role plays a priority objective. Some researchers claimed that the absence of instructors in such learning environments could lead to problems with skill acquisition (McGrath, et. al., 2015). Therefore, the faculty's role stands among the determining factors of the utility of online learning tools. On the other hand, although online learning using mobile devices causes a direct positive impact on learners' academic success, instructors' tracking and facilitation create another distinct impact. Instructor's intervention in this context can be managerial participation in the form of providing selected materials, motivating interaction among the peers, or giving advice for selecting a preferred computer program, as well as it can be instrumental in removing the bottlenecks of student's understanding of e-learning (Alrasheedi & Capretz, 2015).

Moreover, as evident from the literature, mobile devices as a teaching tool can boost students' engagement and improve teacher's roles because these tools offer improved self-directed learning (H.-Alcaide, et. al., 2020). One incentive of e/m-learning is the ease of accessing the materials independent of physical and time constraints. For instance, students can download learning materials, and faculty can grade assignments according to their convenience. However, it demands high confidence that this education style is compatible with different devices (Almaiah, et. al., 2020).

Guspatni's study (Guspatni, 2018) reported that hi-tech practices have impacted learners' learning capability and developed positive perceptions about using social media applications based on synchronous discussion platforms. Social media is deeply rooted in the academic sector and has tremendously improved the educational competence of students (Jin, et. al., 2017). In recent years, different social media platforms have significantly impacted the learning process with collaborative and cooperative learning among students. Through social media, students engage in discussions, learn and exchange ideas, knowledge, and information (Chukwuere, 2021). Therefore, social media usage makes its users technology-efficient.

Understanding the current usage level of the e-learning system among students in Saudi universities demands investigating the effects of various factors depending upon the e-learning platform being used by a particular organization. Various studies reveal that the acceptance of e-learning among students was comparatively poor in the past in Arab countries (Mohammad & Mustafa, 2016). It was even more limited in Saudi Arabia and needs more attention (Almaiah & Alyoussef, 2019). It demands considerable analysis to identify the factors behind this weakness.

Moving further, most LMS studies in Saudi Arabia investigated the functions of LMS, technical usability, and users' attitudes toward the system (Binyamin, et. al.; 2017). Limited research has been conducted to understand the relationship between LMS utilization within the mobile environment and external factors such as social media effects. It is also evident from the literature review that most studies focus on the faculty's perspective or students' perspectives rather than both. Thus, this study tries to fill this research gap.

RESEARCH METHODOLOGY

The study focuses on the Blackboard usage of students and faculty at KAU. The method of this survey is to employ the learning for students and faculty' towards LMS. This section describes the method used for data collection. The instrument development used participants' profiles, and the study sample is also discussed. The data analysis is described at the end of the section. The real-life example of KAU, Jeddah, has been chosen for this study, keeping in mind the following primary objectives:

- To choose an organization of a fast-developing country that recently excelled in e-learning mode of education in a short period.
- To select a larger organization due to the nature of this research since the chances of conflicts among the users are higher in a bigger organization than in a smaller one. The differences between the role of faculty and students in e/m-learning play a crucial role in setting up goals for e/m-learning platforms.
- KAU includes a large population of students and faculty with diverse nature, which would be applicable to any other higher education institution across the Kingdom of Saudi Arabia.

Data Collection

A self-administered questionnaire was developed on a standard universal format using the Qualtrics tool with a few initial questions regarding demographics and other details, including age, gender, title, field of study, and level of study/position at KAU. Following that, there were questions specific to e-learning, m-learning, social media role in learning, and the digital competencies of the users. The questions were developed to determine faculty' and students' perceptions of e-learning and evaluate their competency level with digital devices in m-learning.

As the questionnaire-based study is quantitative, the decision was made to use an online survey. It is developed based on the research question that constituted the above for data collection (Yardley & Bishop, 2017). Previous studies asserted that surveys are suitable for evaluating LMS (Blecken, et. al., 2010). Qualtrics tool is a mobile-friendly tool that can provide a variety of questions and is affordable software for University of Strathclyde students; it was used for collecting data from the participants. The study targets the LMS users studying at KAU in different colleges and levels of education and the faculty with different positions. Due to the appropriateness of resources and wide usage in technology acceptance research (Mortenson & Vidgen, 2016), the non-probability convenience sampling technique is used. The online

survey was available for three weeks, and the link to the survey was sent by email to the participants through the IT dean at KAU. All the participants voluntarily contributed to this study, and the students and faculty were guided regarding the questions to enable them to make rational choices. The survey design and the procedures for data collection are explained below.

Survey Design

The survey used for this study consists of four sections. Each section consisted of different multiple-choice questions based on some objective questions previously written to determine the most used / rarely used Blackboard features. The questions also try to measure the effect of social media and mobility environment on Blackboard, mostly using Likert scales. The first one includes the students' profiles or demographic information and includes 7 items: age, gender, title (student/faculty), position (faculty), field and level of study (student), and college (faculty). The following sections address Blackboard in general, Blackboard on mobiles, and the role of social media in learning. The constructs consist52 of 25 items, i.e., True/False (7 questions), multiple choice (9 questions), 5-point Likert scale (9 questions). On a 5-point Likert scale, one indicates that students/faculty strongly agree / Always with the statements, and five indicates that students/faculty strongly disagree / Never with the statements. To ensure reliability and accuracy, the 25 items were divided into 13 questions about the Blackboard section, 8 in mobile Blackboard, and 4 on the social media role. Furthermore, all the instruments were closed questions.

Procedures

In the first stage, the survey was developed in English and reviewed by two native English speakers to ensure it was free of wording problems. Then, the English version of the survey was translated into Arabic by a bilingual speaker since Arabic is the native language of Saudi Arabia. As the back-translation method was used in (Behr, 2017), the Arabic version was reviewed by two bilingual speakers. It is worth mentioning that the word LMS was replaced with Blackboard since Blackboard is the LMS in use there.

After completing the data collection stage, the collected data was entered into Excel software for descriptive statistical tests. The data set was used to analyze the survey data using Frequencies, One-way ANOVA (for questions with more than one variable), and one sample t-test (for questions with a single variable). Since the survey has many cases to analyze, these analyses were done programmatically by using EXCEL formulas (i.e., "SUM," "COUNT," and "IF"). The formulas do all simple and complex calculations. Moreover, because the questionnaire has many conditional logics, some formulas must be conditional (using: "IF", "COUNTSIFS", "ISNUMBER", nested IF, and "SUMIF") to capture correctly the number of questions each user should have answered. The conditional logic is mandatory in surveys involving diverse participants such as faculty and students in our study. Therefore, some questions will appear only for faculty and others for students only. In addition, as with all complex code, including Excel formulas, these formulas were carefully verified (by checking randomly selected examples against the manual calculation). A randomly generated number for anonymity switched each participant's name.

A deeper analysis was performed by Principal Component Analysis (PCA). This method reduces the dimension of the feature space. Also, it brings together the following:

- A measure of how each variable (question) is associated with one another (Covariance matrix.).
- The directions in which the data (response) is dispersed (Eigenvectors.).
- The relative importance of these different directions (Eigenvalues.)
- PCA combines the predictors and allows to drop the relatively unimportant eigenvectors.

FINDINGS

This section presents the research findings. The results include demographic information, descriptive statistics, reliability and validity, and hypothesis testing. The total number of received responses is 634. Qualtrics registered 432(68%) complete responses (answer all questions) and 202 (32%) incomplete responses. 202 responses consist of two parts: 168 (83%) were considered incomplete since the participants

sent the survey without completing or closing it. However, 34 (17%) of the 466 are partially complete and marked as complete (since the participants decided to leave the survey and close it).

Analyzing the completion percentage in the 202 incomplete responses is considered relatively high. Looking closely at these incomplete responses, all have the same pattern as complete responses (female responses more than male, students more than faculty, student level of study, and faculty position). Moreover, 70% of incomplete responses would be ignored since they include basic information. However, 28% could not be considered as well since this category only applies to the studied case. 41 participants were school students, not KAU faculty/students or people who work in administration at the university. 17 participants just chose "other level" of study without any details. 432 (68%) responses (138 male, 294 female) and (97 from the faculty, whereas 335 from the students) are considered in the analysis stage, which gives accurate, complete results.

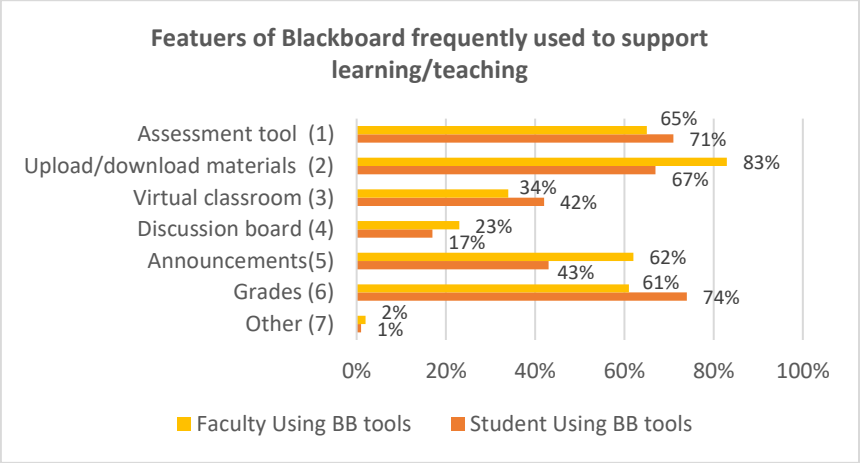
Participants' Demographic Information

Table I and Table II summarize the students' and faculty profiles. 98 students (71%) are male, and 237 (81%) are female. Also, 40 faculty (29%) are male, and 57 (19%) are female. Most students (67%) are between 17 and 24 years old. However, most faculties (46%) are between 25 and 35 years old. Regarding the education level, most participants are students in their senior year (32%). For the position, most faculty are lecturers (32%). The study includes students and faculty from different disciplines, fields, and colleges.

Blackboard Use

Figure 1 elaborates that each instructor and student has a low usage percentage of the discussion board. The findings show that the faculty's behaviors affect the students' usage. This is due to the usage patterns since most faculty use Blackboard as an assessment tool and for publishing class materials and performing students' grading. Students utilize Blackboard to do their assessments, share class materials, and review their grades. Moreover, for faculty and students, discussion tool is considered less utilized.

FIGURE 1
COMPARISON OF BB TOOL USAGE BY FACULTY AND STUDENTS



Faculty use announcements more than students to post course announcements; however, usually, the students do not check them. In contrast, some tools had the lowest values among the students and faculty within the 1-2% range, indicating that the mentioned blackboard tools are used frequently.

TABLE 1
FACULTY DEMOGRAPHICS

Characteristics	Groups	N	%
Gender	Male	40	29
	Female	57	19
Age	17-24	0	0%
	25-35	45	46%
	36-45	38	40%
	>45	14	14%
Position	Teacher Assistant	16	17%
	Lecturer	31	32%
	Assistant Professor	30	31%
	Associate Professor	13	13%
	Professor	7	7%
College	Economics & Admin	10	10%
	Science	6	6%
	Engineering	4	4%
	Medicine	18	19%
	Applied Studied	18	19%
	CS & IT	10	10%
	Human Science & Design	4	4%
	Applied Medicine Science	5	5%
	Art & Humanities	6	6%
	Others	16	17%

TABLE 2
STUDENTS' DEMOGRAPHICS

Characteristics	Groups	N	%
Gender	Male	98	71
	Female	237	81
Age	17-24	225	67%
	25-35	90	27%
	36-45	17	5%
	>45	3	1%
Education Level	Preparatory year	72	21%
	Junior year	67	20%
	Senior year	108	32%
	Training	5	2%
	Master	57	17%
	PhD	5	2%
	Other	21	6%
Field of Study	Economics & Admin	45	13%
	Science	42	13%
	Engineering	12	4%
	Medicine	21	6%
	Applied Studies	29	9%

Characteristics	Groups	N	%
Field of Study	CS & IT	46	14%
	Human Science & Design	14	4%
	Law	20	6%
	Foundation Tear	35	10%
	Art & Humanities	26	8%
	Others	45	13%

Since the background of this study is based on Technology Acceptance Model and the most important factors that impact the user's actual use are usefulness and ease-of-use, therefore the questions regarding these two factors were included. As shown in figures 2 and 3 respectively, both faculty and students agree that most of the tools are useful and easy to use. However, by analyzing the previous result with this question response, both have natural responses especially with the discussion board and virtual classroom and that since most students and faculty do not use them as much as other tools.

FIGURE 2A
USEFULNESS OF BLACKBOARD, STUDENT PERSPECTIVE

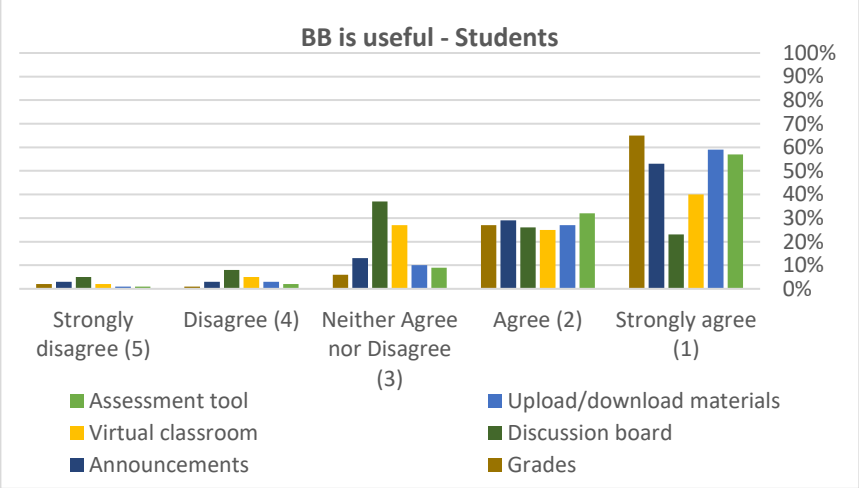


FIGURE 2B
USEFULNESS OF BLACKBOARD, FACULTY PERSPECTIVE

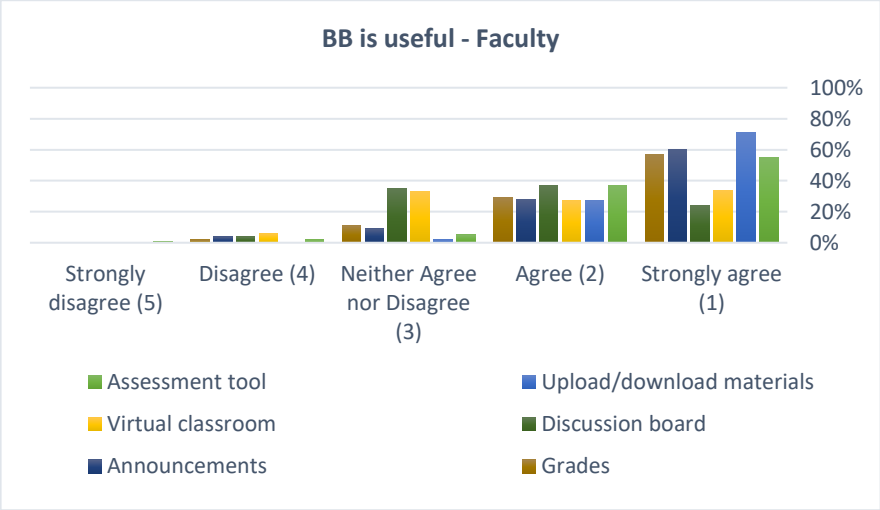


Figure 4 provides useful information about the need for improvement of Blackboard LMS. Faculty and students clearly state that there is room for improvement, especially with some Blackboard tools as can be seen in the following figure.

FIGURE 3A
BALCKBOARD EASE-OF-USE, STUDENT PERSPECTIVE

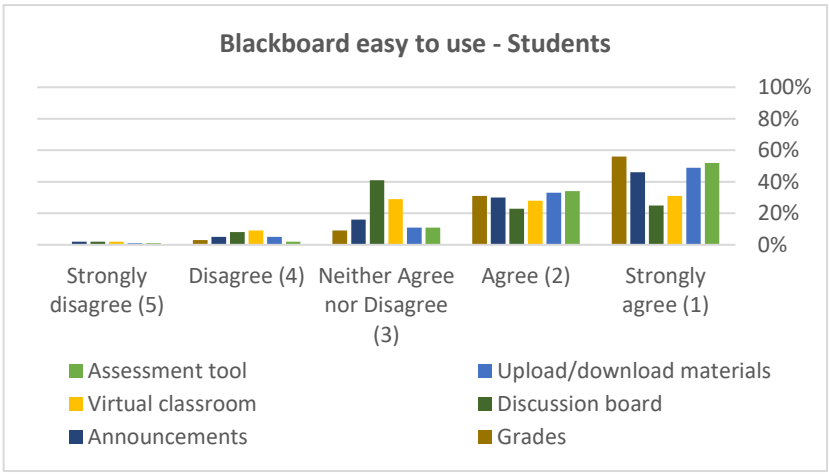


FIGURE 3(B)
BALCKBOARD EASE-OF-USE, FACULTYPERSPECTIVE

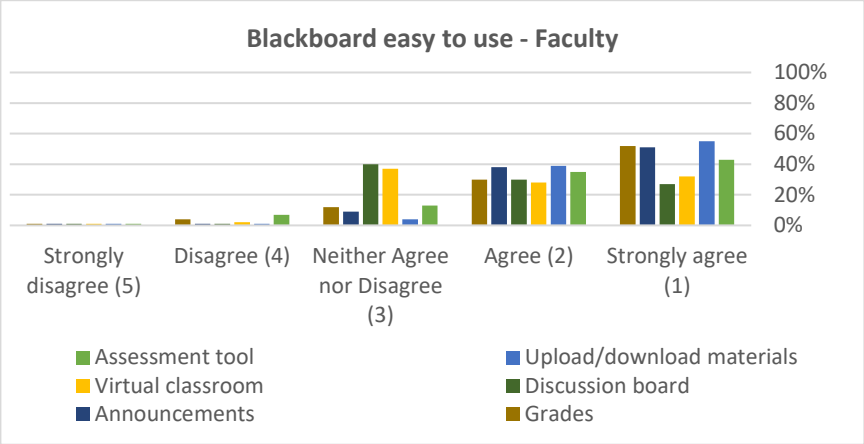


FIGURE 4
NEED FOR IMPROVEMENT OF BLACKBOARD LMS

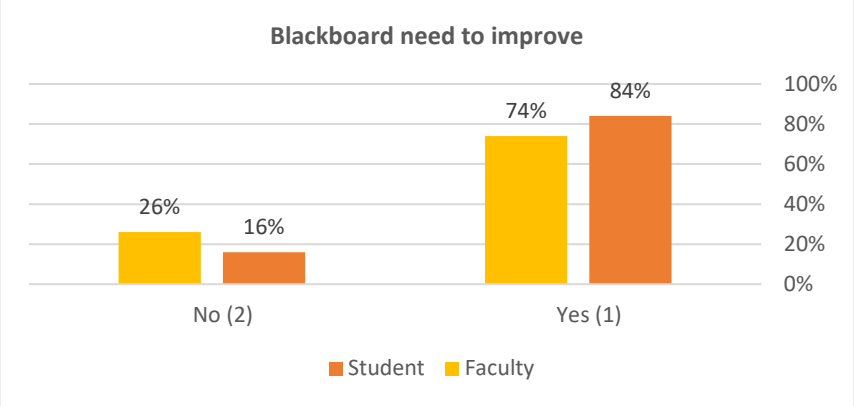
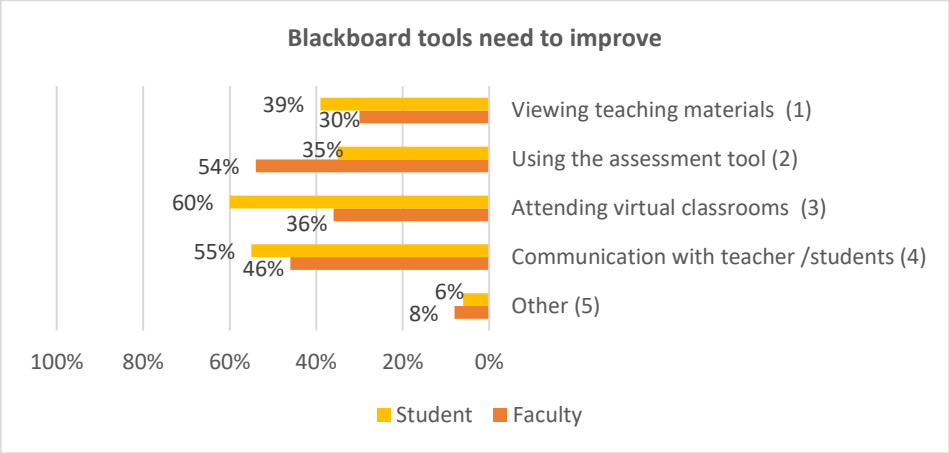


Figure 5 provides further insight into the Blackboard improvement domain as to which tools need to be improved since some tools are difficult to use due to a lack of knowledge, tools that students and faculty do not use, or the technical support that is sometimes unavailable, as seen in figure 5. The major areas that need improvement from students' perspective include virtual classroom mobile access, discussion boards, and having a more user-friendly interface. However, the faculty highlighted that the mechanism of handling students' attendance, students' project evaluation, and communication /transferring teaching materials needs improvement.

FIGURE 5
NEED FOR IMPROVEMENT OF BLACKBOARD TOOLS



Mobile Blackboard

Nowadays, everyone from all fields of life prefers to use mobile devices for every task. Thus, the mobile blackboard was also examined in terms of student and faculty satisfaction and ease of use. Figures 6 and 7 show that the students' and faculty' satisfaction with tools is relatively high for most blackboard tools they used to work with (as concluded in the satisfaction questions result for both). Therefore, if the mobile Blackboard is further improved, it will always engage more users. However, faculties still do not prefer to use mobile devices with assessment tasks because more distractions and communication may occur.

FIGURE 6
STUDENTS' SATISFACTION WITH MOBILE BLACKBOARD

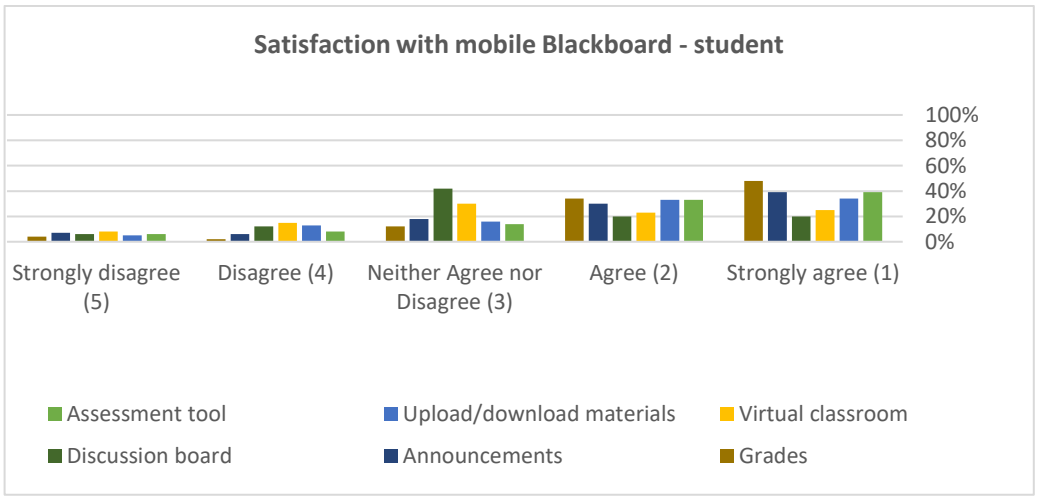


FIGURE 7
FACULTY'S SATISFACTION WITH MOBILE BLACKBOARD

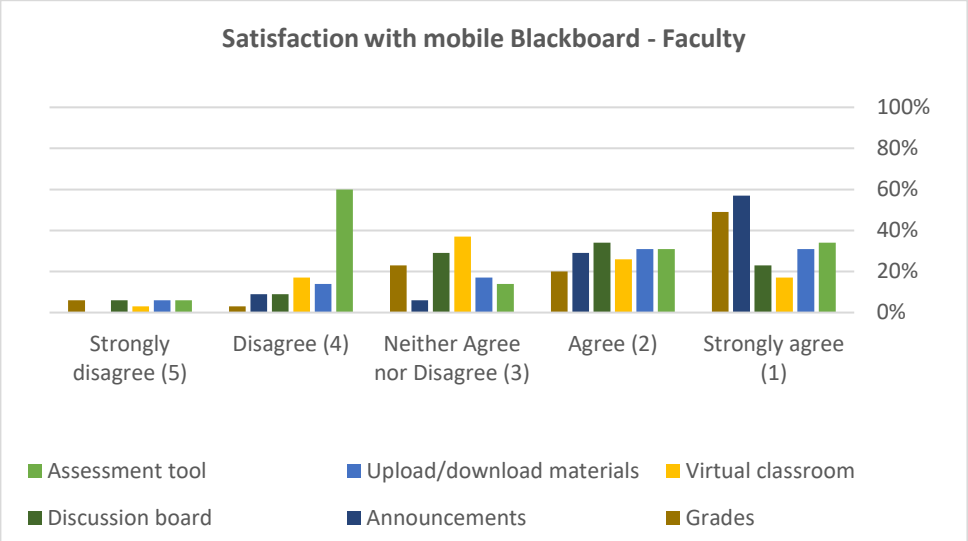
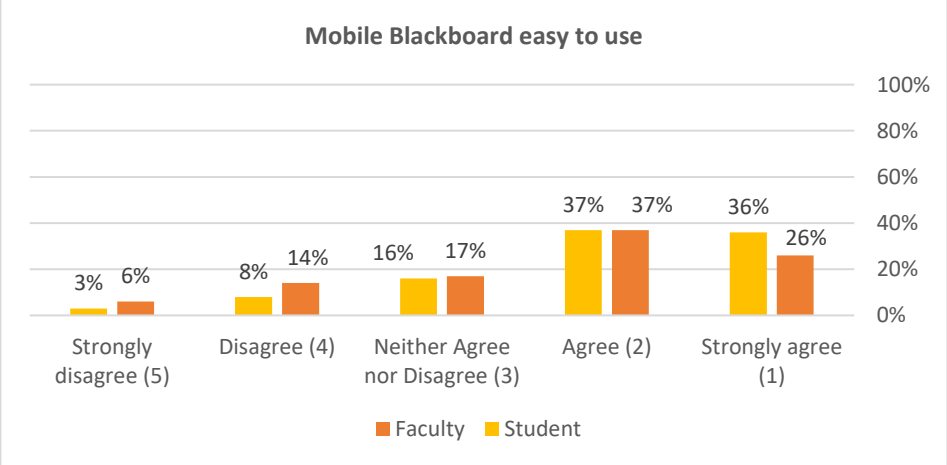


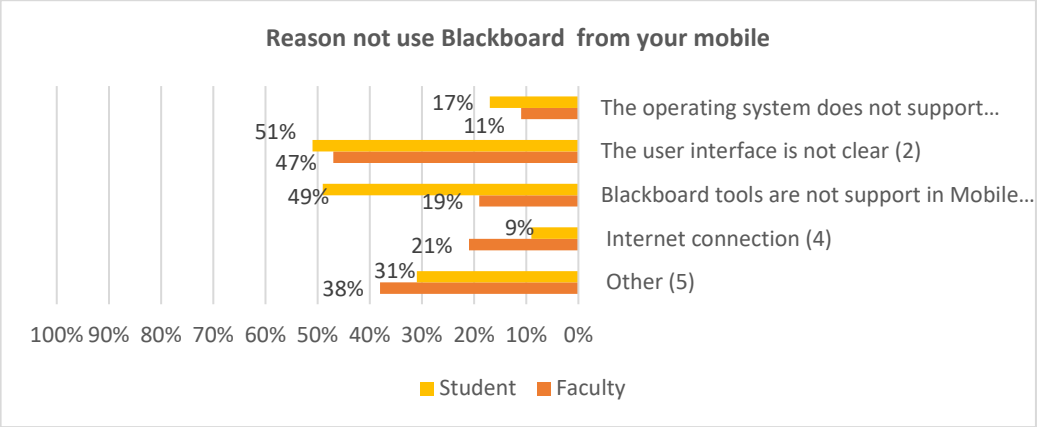
Figure 8 provides further insight regarding the ease-of-use of mobile Blackboard and indicates that most students and faculty agree that the mobile blackboard is easy to use; however, about 40% faced different issues with the mobile blackboard, such as attending the virtual classroom session for students and previously mentioned assessment tools for the faculty.

FIGURE 8
MOBILE BLACKBOARD IS EASY TO USE



Although mobile usage is relatively high, the mobile blackboard issues indicate different reasons that affect mobile Blackboard usage. Figure 9 summarizes some participants' reasons for not using the Blackboard from mobile devices. As can be seen, not all participants are fully satisfied with using the Blackboard within the mobile environment and have some issues with the mobile Blackboard interface due to the screen size or the quality of the tools used in the mobile environment. Some tools are not supported or even appear properly in the mobile environment. Also, uploading /downloading materials, slides, and homework are inconvenient through mobile devices.

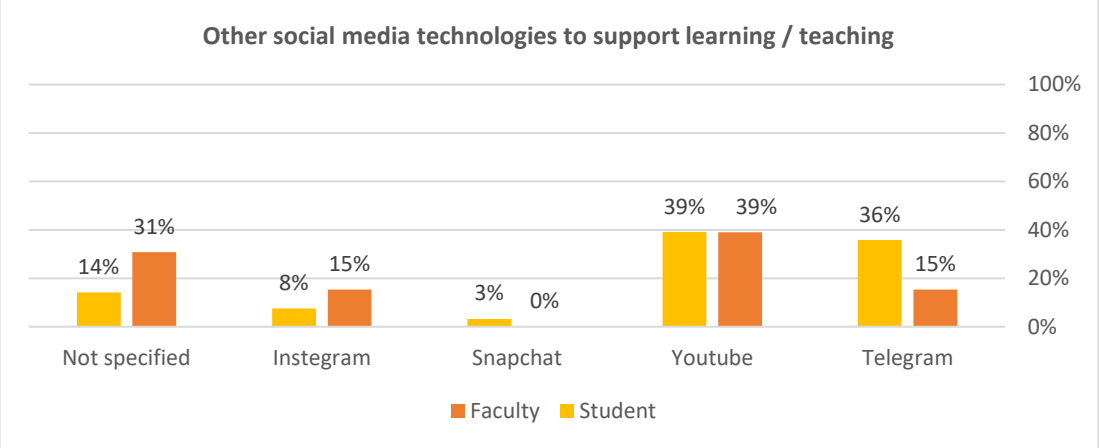
FIGURE 9
REASONS TO NOT USE MOBILE BLACKBOARD



Beyond Blackboard

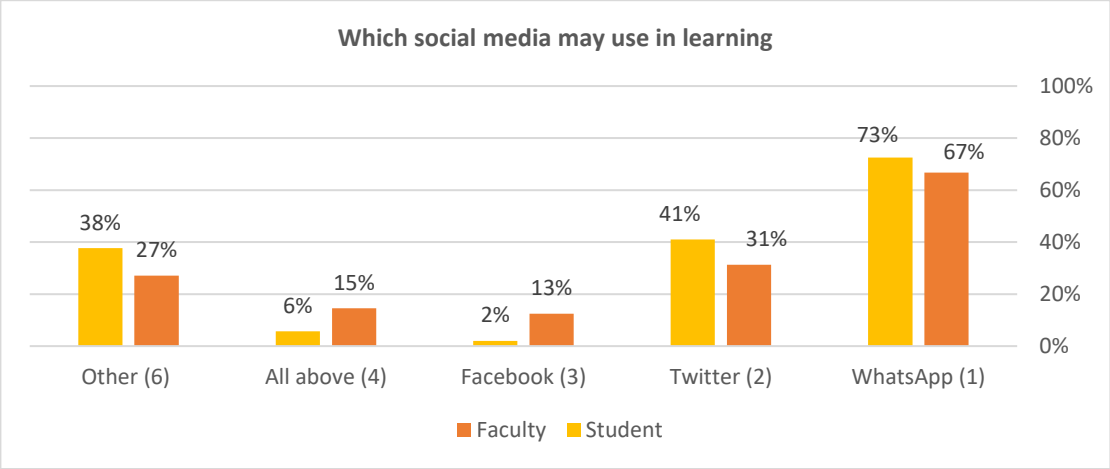
Figure 10 summarizes the results of the social media analysis and indicates that most participants use social media to support their learning process. As mentioned previously, most of the faculties do not prefer to have any evaluation tasks performed through mobile since most social media applications are mobile-based. However, the relationships maintain two sides of effect. It could positively impact Blackboard usage if it collaborates with Blackboard activities. However, the negative effect could be more distraction and less engagement with Blackboard tools. Most participants still prefer different social media applications to support the learning/teaching process.

FIGURE 10
USE OF SOCIAL MEDIA IN THE LEARNING PROCESS



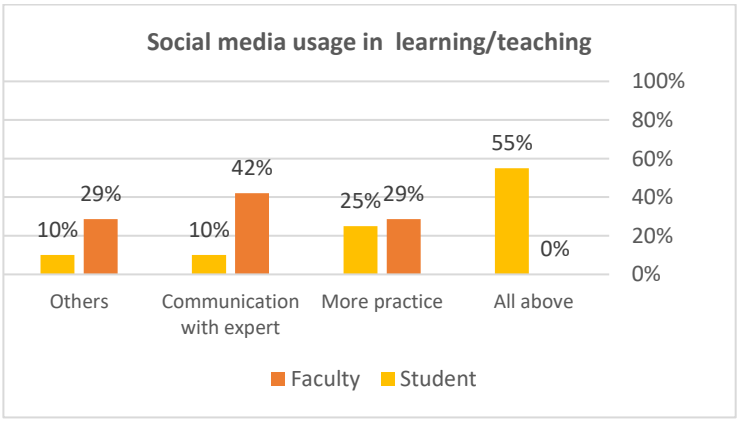
As seen from Figure 11 that WhatsApp and Twitter are the most utilized tools for communication with other colleagues and instructors, which explains the low usage percentage of the Blackboard discussion tool. Social Media communication platforms may lead to more distractions during the learning session by viewing other news and receiving irrelevant messages and calls.

FIGURE 11
ENGAGEMENT TOWARDS SOCIAL MEDIA TOOLS



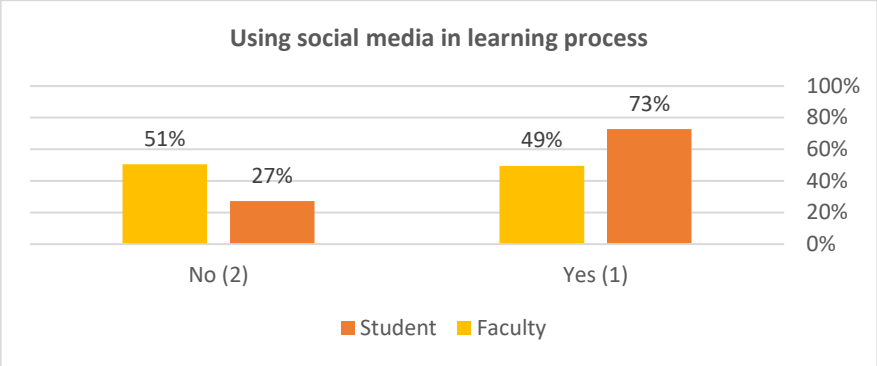
In the Others category, the participants mentioned other tools such as YouTube and Telegram channel as preferred tools in social media to support the learning /teaching process and searching for more scientific reference and practice as seen in Figure 12. However, other tools were mentioned that were not considered as social media such as Google Drive and email for submitting reports, homework, projects and communicating with instructors. Also, Google Scholar is used for more scientific references.

FIGURE 12
OTHER CATEGORIES OF SOCIAL MEDIA TOOLS



As shown in Figure 13, participants mention other social media usage such as communicating with some experts to seek more information and references regarding specific topics. Also, search for more practice and examples for some unclear topics.

FIGURE 13
SOCIAL MEDIA USAGE



PCA Algorithms – High Level of Analysis

By ending the previous analysis phase, the conclusion was drawn that there is some correlation between different features (questions) in the faculty and student group. Also, some features have significant impacts on others for both groups. A total of 84 features exist from different questions since there is a total of 33 questions (features); however, some questions appear for both students and faculty (in this case, the question consider as two different features, one related to the instructor and the other related to the student). PCA algorithm was used to reduce the dimension of the feature space from 84 to 24 important variables by:

- A measure of how each variable is associated with one another (Covariance matrix.).
- The directions in which our data are dispersed (Eigenvectors.)
- The relative importance of these different directions (Eigenvalues.)

PCA combines the predictors and allows the drop of the relatively unimportant eigenvectors. The chart in Figure 14 represents the 24 most important features after applying the algorithm. Some of the 24 features were interpreted in Table 3 below. Notice from the table that some features appear twice, meaning that it has a high rank for both faculty and students.

FIGURE 14
24 MOST IMPORTANT FEATURES BY PCA

TABLE 3
REDUCED DIMENSION OF FEATURE SPACE

Most Important Feature Name	Feature Importance
Field of study - question appears for student	79%
I am satisfied with how Virtual classroom in Blackboard works on my mobile phone/tablet.	27%
I am satisfied with how Virtual classroom in Blackboard works on my mobile phone/tablet.	51%
College - Question appears for faculty	68%
for what you use the other social media technologies (such as WhatsApp and twitter)?	79%
for what you use the other social media technologies (such as WhatsApp and twitter)?	49%
Study level	86%
Virtual classroom tool	38%
While using Blackboard; do you think the technical support available is sufficient?	49%
While using Blackboard; do you think the technical support available is sufficient?	40%
Use of technologies like the above for learning and teaching is necessary.	71%
Use of technologies like the above for learning and teaching is necessary.	44%
Faculty position	45%
Faculty position	33%
How do you evaluate your using of Blackboard from your mobile phone/tablet?	58%
Age	31%
Assessment tool	42%
Accessing Blackboard from my mobile phone/tablet works well.	46%
I am satisfied with how Assessment tool (homework, test, etc.) in Blackboard works on my mobile phone/tablet.	47%
I find Assessment tool (homework, test, etc.) in Blackboard useful.	45%
I am satisfied with how Announcements (contact faculty and students) in Blackboard works on my mobile phone/tablet.	35%
I am satisfied with how Upload/download/view teaching materials in Blackboard works on my mobile phone/tablet.	37%
I am satisfied with how Upload/download/view teaching materials in Blackboard works on my mobile phone/tablet.	43%
I am satisfied with how Discussion boards in Blackboard works on my mobile phone/tablet.	50%

Figure 15 shows the variance of the 24 features. The variance percentage is high (above 95%), which shows the significance of continuing to analyze the features and determining which quality attributes/features improvement significantly impact the different categories of users. Other features that are less than 90% are considered in acceptable level of quality for both faculty and student. It can be seen that virtual classroom, announcement and discussion tool achieve the highest level, which support the participants' previous claim that these tools need an improvement.

FIGURE 15
VARIANCE OF 24 FEATURES

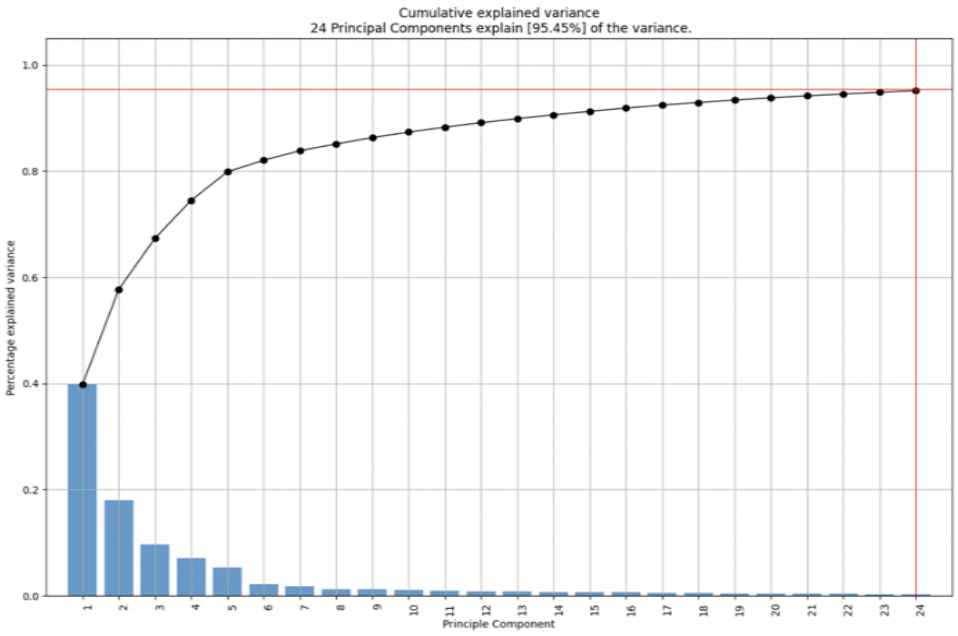


Figure 16 represents the most important features (variables that appear multiple time in the previous chart (Figure 14). Most of the questions are related to the mobility environment and social media, which shows that these are two research areas to investigate. It is due to the fact that most participants prefer to support their learning and teaching by getting an advantage from the available social media applications. Mobile devices are also intended to be the most usable and powerful devices in all different fields, which support our claims to spend more time on improving the quality of LMS used within mobile environment.

DISCUSSION

As limited research has been done to understand students' and faculty' use of LMS, this study investigated the factors influencing the students' utilization of LMS. Similar to other studies (Alrasheedi & Caprets, 2015; (Alghazi, et. al., 2020; Binyamin, et. al., 2017; Jin, et. al., 2017), this study investigates the usage of different Blackboard features in understanding the level of acceptance and usage of e-learning, particularly in Saudi higher educational institutions. The study aimed to explore the mobile effects of blackboard use in Saudi Arabia.

Moreover, it investigates whether social media complements the blackboard role. First, we investigate RQ1 for the quality attributes of Blackboard tools. The statistics show which blackboard tools are mostly used and which ones the users struggle with. The figures reflect the unequal usage of each tool by faculties and students. The most heavily utilized tool is upload/download materials by faculty (83%) and students (67%). Following that, the faculty makes approximately equal use of the Assessment Tool, Announcement Tool, and Grading Tool; the same is true for students. However, an important observation is that none of the faculties and students rely on the Discussion Board for communication and prefer to use other social media platforms, especially WhatsApp, for intra-class communication. Hence, the results are a perfect match with the hypothetical model. The study also illustrates the mobile blackboard usage statistics among faculty and students. The percentage of mobile blackboard users, faculty and students is very high and found to be approximately 60%. However, both types of users rated the portal's ease of use as around 50%. Furthermore, as the figure depicts, the students' trend towards using blackboard from mobile devices is tremendously increasing. It has been observed that faculty and students use social media for most of the educational tasks,

with 49% of faculty and 73% of students. However, the trend of using the Blackboard portal as a discussion board is significantly low due to users' inclination towards other social media apps like WhatsApp as a discussion forum.

Generally speaking, the results prove that Saudi Arabian students perceive the mobile blackboard positively. This indicates the students' satisfaction with e-learning and provides evidence that Saudi Arabia is fertile soil for educational development and technology adoption. Social media has a positive effect if it supports the learning process and LMS tools and has a negative impact if it is used as an alternative to blackboard tools, for instance, using other social media apps such as WhatsApp for communication which and keep ignoring the discussion and announcement tools for communications. Using social media applications may cause some distraction for students and instructors while they still receive other messages and calls. The main objective is to improve the quality of the current practice of Blackboard and make the most of mobile and social media usage in this matter.

This study has found some very interesting and useful results which are normally distributed. However, concerns about mobile Blackboard, technical and professional issues with Blackboard features, and virtual classroom limitations in real working life (especially in COVID-19 circumstances) encourage efforts towards improved Blackboard distance learning features in mobile. Also, by looking at Questions 2 and 4, there are threats of reality since question 2 showed that the female responses are more than male (for faculty in different positions), whereas, in the real KAU community, the males are more in number than the females. An accurate number of total males and females are not available on the university website and require many procedures to request it. This could be a limitation of this study since it could not compare the result to the actual university numbers.

Furthermore, question 14 states that the IT students faced more problems with Blackboard, which is considered a threat to reality since they are experts in technology and use Blackboard tools more than other students from different majors. The faculty and students who used Blackboard tools face more issues since others might not use many tools, so they do not report many problems.

LIMITATIONS AND FUTURE WORK

The study is not free of limitations. The experiment sample includes more female than male students and three Ph.D. students. For this reason, another study might expand the sample to include more female participants and Ph.D. students. Additionally, the participants were students of a single institution. The scope of the study could be expanded to include students from different academic institutions or universities in Saudi Arabia. This study has considered the point of view of only faculty and students. However, future research could consider the technical support staff as well. Finally, the results obtained from this research could be more complex by examining the mobile features and effects of using Blackboard on mobile. In conclusion, the future goal is to determine what quality attributes/features have effectively impacted the e-LMS, accessed from both computer devices and any other mobility environment.

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