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Students' and Instructors' Perceptions of the Use and Impact of Smart Mobile Learning at the UAE University

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Teaching and learning are challenging and demanding tasks for both teachers and students. Teachers put a lot of effort into teaching content to students while helping them understand it. At the same time, students need to work hard and have a positive attitude toward learning and teaching, especially in technology-enhanced classrooms where smart mobile learning (SML) occurs. This study explored students' and faculty members' perceptions regarding the use and impact of SML on teaching and learning. A questionnaire with closed and open-ended questions was used with 401 students and instructors at the United Arab Emirates University. Results showed very high positive perceptions toward samrt mobile learning (SML) by both students and instructors. Additionally, students reported numerous advantages for SML as regards learning content and interacting with others.

Keywords: *Smart and mobile learning, Students' perceptions, Faculty members' perceptions, Mobile learning*

1. Introduction

Mobile phones are becoming increasingly important in learning. Educationalists worldwide are using mobile learning and distance learning in instructional settings (Hwang & Chang, 2011). Smart mobile learning (SML) empowers distance learning (Basoglu & Akdemir, 2010; Nah, White, & Sussex, 2008).

Anastasia (2013) conducted a study investigating the effectiveness of SML. Results showed that the students enjoyed using cell phones in class. Basoglu and Akdemir (2010) examined college students' use of phones in a Compulsory Preparatory Program in a state-funded college.

The students reported that mobile phones helped them enormously in improving their vocabulary.

2. Literature review

The education sector in the United Arab Emirates (UAE) has made huge strides since the country was formed in 1971. The leadership of the nation continues to place education at the forefront of government plans. The national agenda, Vision 2021, places a first-rate education system as one of six national priorities that will help the country achieve a competitive knowledge economy (Vision 2021, 2018). Thus, a good technological infrastructure is vital.

Undeniably, technology has filtered into every part of life in the 21st century, for example, smartphones, tablets, laptops, and even smart lightbulbs. We are becoming increasingly familiar with the benefits and uses of mobile technology. The education sector is no different. Smartphones, tablets, and laptops all allow the student to adopt an "anytime, anywhere" approach to learning. When using smart and mobile technology, several interactions take place.. With the development of smart technologies, smart e-learning has been widely accepted. This has allowed innovative approaches to education, using smart technologies to deliver online learning (Lyapina, Sotnikova, Lebedeva, Makarova, & Skvortsova, 2019).

The easy to access, anywhere, anytime approach to SML is advantageous for students (Zhonggen, Ying, Zhichun, & Wentao, 2019). Learning happens at a distance, and students interact with the learning content, as well as with the instructor and other students (Alqurashi, 2019).

2.1. Students' perceptions of SML

It is important that students perceive SML as beneficial, as this will be reflected in their learning experience (Alqurashi, 2019). Students generally have positive views of SML (Zhonggen et al., 2019); however, various factors affect these perceptions. For example, students who use smartphones on a daily basis will be more positive about using them for learning (Al-Emran, Alkhoudary, Mezhuyev, & Al-Emran, 2019; Ariel & Elishar-Malka, 2019). Similarly, Hao, Dennen, and Mei (2017) surveyed 292 university students in China and found that the ease and usefulness of SML were two key drivers for students to embrace the concept.

Several studies have researched self-efficacy and SML. In a study in South Korea, Han and Yi (2019) studied smartphone usage and academic performance among university students. The study revealed that self-efficacy had a directly positive relationship with a student's intention to use a smartphone. Similarly, Nand, Pitafi, Kanwal, Pitafi, and Rasheed (2020) also found a strong positive correlation between students' self-efficacy in smartphone-use and their willingness to use them in learning. Yeap, Ramayah, and Soto-Acosta (2016) noted that students' confidence in their own technological ability affected their perceptions of SML, as did the perceived usefulness of the concept.

Alqurashi (2019) surveyed 167 undergraduate students who were studying online and noted that student interactions with other learners and instructors, besides the course content, were crucial in course satisfaction. Similarly, self-efficacy had a direct impact on perceived learning in the online environment.

In a study by Zhonggen et al. (2019), SML allowed for good communication and cooperation, and teachers were able to provide a more personalized learning approach. Simanjuntak, Dewi, and Rifai (2018) found that students felt there was an aspect of personalization in SML. Kwet and Prinsloo (2020) suggest that one aspect of incorporating SML in the classroom is the personalization of the experience and using technology to make this happen. One advantage is the flexibility that online learning affords (Lyapina et al., 2019). When compared with students who were studying without SML, those in the SML group had a more "enriched" learning experience (Zhonggen et al., 2019).

2.2. Instructors' perceptions of SML

While student perceptions of SML are important, the opinions of staff members must also be considered if SML is to be adopted into an institution. In a qualitative study that compared the views of high school teachers and students on SML, Lai, Hwang, Liang, and Tsai (2016) discovered different preferences. Teachers preferred continuity and a well-constructed platform, whereas students focused more on the content of the SML and its usefulness.The researchers suggest that these differing preferences be considered when SML apps are created to cater to and engage students while being user friendly for the instructor. Generally, instructors look favorably upon SML, as it allows students flexibility in their learning despite it often resulting in an increased workload for staff (Al-Hunaiyyan, Alhajri, & Al-Sharhan, 2017).

2.3. SML in colleges

When considering student perceptions of SML based on the course they are taking, Han and Yi (2019) found that natural sciences students had greater intentions to use smartphones compared with humanities students. Thus, this could have an impact on their perceived academic performance.

2.4. Gender and SML

Several studies have specifically researched gender and SML. Reychav and McHaney (2017) found that females preferred using SML in group learning and that they spent more time viewing videos in group learning than males. Simanjuntak et al. (2018) found that males and females were both positive about SML overall. In Saudi Arabia, there is a considerable gap regarding male and female education. Alasmari (2020) studied how SML could help bridge this gap after surveying female students and found that SML allowed them to have more

comfortable discussions and gain feedback from male lecturers. In the UAE, Al-Emran et al. (2019) found that gender had an effect on SML, with females being less positive than males.

2.5. Advantages and disadvantage of SML for students

Mobile apps can help supplement classroom learning (Arain, Hussain, Rizvi, & Vighio, 2018). Smartphones are useful in many ways, especially as they afford access to many different tools, such as blogs, books, and lectures. Further, videos and pictures can be used for collaborative learning (Ariel & Elishar-Malka, 2019; Iqbal & Bhatti, 2020).

According to Wrigglesworth (2020), students reported that they not only built relationships with other students through small group discussions but that the asynchronous nature of using a smartphone allowed them time to re-read text, gain deeper meaning, think about comments they would make, and use dictionaries, grammar resources, and other materials.

On the other hand, using Mobile devices in SML environment could have some concerns raised by some researchers (Ariel & Elishar-Malka, 2019; Iqbal & Bhatti, 2020). According to Santos, Bocheco, and Habak (2018) students could use their devices for non-learning purposes during class time. On a cultural level, in Kuwait, Al-Hunaiyyan et al. (2017) found that there were some concerns about how SML would allow communication between males and females in a conservative society.

To conclude, studies have shown both benefits and drawbacks to SML. Nand et al. (2020) advocate that higher educational establishments should run workshops and courses to highlight the benefits of SML in learning, as well as making learning more accessible from smart devices.

2.6. The rationale for the study and its uniqueness

Although prior research shows us the usefulness of SML in teaching and learning, there is a lack of studies documenting the use in the UAE. SML is still in the early stages of application in this part of the world; thus, considerable work remains to be accomplished. It worth mentioning here that the UAE University not only supports an SML infrastructure but also provides weekly professional development for faculty members and 24/7 online access to training courses. As previously indicated, similar studies have been conducted on the topic worldwide. However, this study is unique for the following reasons:

1. **Student and instructor perceptions of SML**

This study investigated SML in teaching and learning apropos both students and instructors, considering all three variables related to SML (interaction, motivation, and communication) along with their 24 components. Additionally, it incorporated technology integration in the SML environment vis-à-vis the 10 variables of traditional classroom instruction. Moreover, this study highlighted the teaching strategies deployed in SML environments in comparison to traditional classes using all three variables of general teaching strategies, cooperative learning, and assessment as well as their 26 components.

2. SML in different colleges

This study attended to student perceptions of SML based on the courses they were taking and their specialization faculties, such as natural sciences and humanities. Per se, the courses and majors could impact the perceived academic performance of students and the ways student achievements could be influenced by the college to which a learner is affiliated.

3. Gender and SML

Gender was considered a variable in this study's investigation of SML to accord a clearer perspective of the effects of gender on perceptions with respect to the delivery method.

4. Student benefits of using SML

This study also examined the advantages and disadvantages of SML through an open-end question, which offered students an added opportunity to authentically express their real feelings toward SML further.

5. Skilling university instructors

Instructors in the UAE University were trained on the Technological Pedagogical Content Knowledge model to familiarize them with the integration of subject content, pedagogical techniques, and mobile technology. Thus, they were appropriately skilled in using SML as a teaching model.

3. Research questions

This study aims to answer the following question: How do students and instructors perceive SML as a method for learning?

To answer this question, the following sub-questions have been formulated:

1. Are there any significant differences between students' and instructors' perceptions of the use of SML in teaching and learning?
2. Are there any significant differences between perceptions of SML in teaching and learning due to gender?
3. Are there any significant differences between perceptions of SML in teaching and learning due to the college attended?
4. What advantages do students report in SML classes?

4. Method

4.1. Participants

The participants in this study were 401 students (94.8%) and instructors (5.2%) studying/teaching SML courses at the UAE University during the academic year 2019–2020. The study included both male and female students and instructors (Table 1).

Table 1. Participants by gender

	Frequency	Percent
Male	85	21.2
Female	316	78.8
Total	401	100.0

Participants were from all 9 scientific and nonscientific colleges with a very close students and instructors representation from each college.

4.2. Data collection

A questionnaire focusing on students' and instructors' perceptions of the use and impact of SML on teaching and learning at the UAE University was used. The questionnaire was developed by the researchers and then validated by several experts in the field of technology. It comprised seven themes related to SML: Interaction, Technology Integration, Cooperative Learning, Assessment, Teaching and Learning Strategies, Motivation, and Communication. Cronbach's alpha was 0.98, which is considered very high. The questionnaire included two open-ended questions asking participants to report the advantages and disadvantages of SML.

4.3. Data analysis

SPSS 25.0 was employed to perform two types of statistical analysis on the collected data: (1) descriptive statistics and (2) independent samples t-tests. Additionally, data analysis and frequency counts were utilized for the two open-ended questions.

5. Results

To answer Question 1 regarding perceptions of SML in teaching and learning, Table 2 shows the independent samples t-test for the students and instructors. All seven variables related to SML were compared to traditional classes. In particular, peer interaction helped students understand better; learner–learner, learner–instructor, and learner–interface interaction were more effective; student–student interaction was appropriate and timely; course interaction supported learning; and methods used for interaction were appropriate. There were no

significant differences between students' and instructors' perceptions of the seven variables. However, all the five remaining variables relating to online interaction showed significant differences between students' and instructors' perceptions, namely, learner–content interaction was more effective, learner–instructor and learner–content interactions were appropriate and timely, student engagement throughout the course was high, and student engagement in class activities was high.

Similarly, there were no significant differences between students' and instructors' perceptions of the six variables associated with motivation. Specifically, the classroom activities were more motivating and more interactive, student motivation for learning increased during the course, students' interest in the subject improved, students felt very comfortable with SML, and students recommended the SML courses. The final three variables related to online motivation and showed significant differences between students' and instructors' perceptions, specifically students' interest in participation was more widespread, they would like to take other SML courses, and they preferred SML courses. In terms of all the variables connected to interaction, motivation, and communication, instructors recorded slightly higher means in most of the variables than the students did.

Table 2. Interaction, motivation, and communication in the SML environment compared to traditional classes

Variable	Students $\bar{x}$	Students SD	Instructor $\bar{x}$	Instructor SD	t.
Interaction					
Peer interaction helped students understand better.	4.08	1.06	4.29	0.64	−1.37
Learner–learner interaction was more effective.	4.08	1.02	4.29	0.78	−1.17
Learner–instructor interaction was more effective.	4.12	0.98	4.29	0.64	−1.12
Learner–content interaction was more effective.	4.08	0.97	4.52	0.51	−3.62*,
Learner–interface interaction was more effective.	3.98	0.96	4.24	0.54	−1.10
Student–student interaction was appropriate and timely.	3.88	1.03	4.10	1.04	−0.94
Learner–instructor interaction was appropriate and timely.	4.09	0.94	4.48	0.60	−2.73*
Learner–content interaction was appropriate and timely.	4.03	0.95	4.38	0.50	−2.98
Interaction in the course supported my learning.	4.10	0.96	4.33	0.58	−1.71
Interaction methods were appropriate.	4.18	0.97	4.43	0.51	−2.02
Student engagement throughout the course was high.	4.01	0.10	4.52	0.51	−4.25*,
Student engagement in class activities was high.	4.06	0.10	4.43	0.68	−2.39*
Motivation					
Students' interest in participation was more prevalent.	4.04	0.95	4.48	0.60	−3.12*,
The classroom activities were more motivating.	4.10	0.97	4.14	0.79	−0.25
The classroom activities were more interactive.	4.05	0.99	4.14	0.79	−0.53
Students' motivation for learning increased.	3.99	1.02	4.19	0.75	−1.14
Students' interest in the subject improved.	4.07	1.02	4.29	0.64	−1.45
Students felt very comfortable with SML.	4.10	1.01	4.38	0.67	−1.83
I would recommend others to take SML courses.	4.06	1.05	4.48	0.68	−2.62
I would like to take other SML courses.	3.96	1.08	4.48	0.60	−3.62*,

I prefer SML courses due to their advantages.	4.05	1.06	4.48	0.60	−2.98
Communication					
Effective use of virtual classrooms.	3.75	1.22	3.52	1.21	0.83
Effective use of wikis.	3.26	1.47	2.38	1.60	2.46
Effective use of threaded discussions.	3.52	1.39	3.05	1.69	1.26
The use of email is more productive.	4.13	1.01	4.19	0.87	−0.29
Using communication tools (e.g., discussion boards, blogs, and wikis).	3.44	1.54	3.29	1.27	0.53

Note. 1 = "Does not describe the course at all"; 5 = "Describes the course very well"

Table 3 displays significant differences in terms of perceptions towards SML .The result shows that seven of the variables such as using eBooks to enhance understanding, more extensive use of the Learning Management System, more effective use of Internet resources (e.g. videos), more prevalent multimedia, use of technology resources, mobile devices making the course more effective, and using flipped classroom technologies to enhance teaching and learning did not indicate any significant differences between students' and instructors' perceptions of technology integration. In contrast, the results showed significant differences in three variables only favoring teachers. Further, instructors recorded slightly higher means than the students did.

Table 3. Technology integration in the SML environment compared to traditional classes

Variable	Students		Instruct		
	$\bar{x}$	SD	$\bar{x}$	SD	t.
Using eTextBooks to enhance understanding.	3.14	1.57	3.38	1.43	−0.75
Using a variety of software	4.07	1.01	4.43	0.68	−2.32*
Using several mobile apps	3.79	1.13	4.19	0.68	−2.49*
Technology-facilitated learning	4.07	1.02	4.52	0.51	−3.67
More extensive use of the LMS	4.06	0.99	3.95	1.02	0.47
More effective use of Internet resources	4.33	0.89	4.48	0.60	−1.02
Using multimedia was more prevalent.	4.12	1.03	4.33	0.73	−1.28
Technology resources were available.	4.02	1.02	4.00	0.76	0.09
Using mobile devices more effectively.	3.91	1.07	4.19	0.68	−1.80
Using flipped classroom technologies.	3.80	1.11	3.81	0.87	−0.06

Note. 1 = "Does not describe the course at all"; 5 = "Describes the course very well"

Similarly, table 4 displays significant differences in terms of perceptions of teaching strategies in the SML compared to traditional classes. The results indicated that all the variables related to general teaching strategies, cooperative learning, and assessment show no significant differences, except for three variables favoring instrucots. Two of these variables were associated with general teaching strategies,and one related to cooperative learning.

Additionally, instructors had slightly higher means in most of the variables than the students did.

Table 4. Teaching strategies in the SML environment compared to traditional classes

Variable	Students		Instructors		
	$\bar{x}$	SD	$\bar{x}$	SD	t.
General Teaching Strategies are more					
interesting.	4.16	0.93	4.38	0.59	−1.59
motivating.	4.15	0.94	4.38	0.59	−1.70
varied.	4.15	0.94	4.38	0.59	−1.68
student-centered.	4.04	0.94	4.48	0.60	−3.10**
The classroom activities encourage independent	4.10	0.96	4.29	0.72	−1.13
Course objectives are achieved better.	4.19	0.91	4.48	0.51	−2.37*
Cooperative Learning					
increased my interest in the subject.	4.04	1.01	4.05	0.87	−0.03
enhanced my understanding.	4.03	1.02	4.05	0.92	−0.09
was an effective technique.	4.10	0.96	4.05	0.92	0.25
was successful.	4.07	0.96	4.33	0.66	−1.76
enhanced students' social skills.	4.12	.959	4.19	0.75	−0.44
enhanced low-ability students' learning.	3.81	1.07	4.19	0.75	−2.22*
fostered positive student attitudes.	4.04	0.99	4.24	0.77	−1.18
helped students learn more.	4.04	0.99	4.00	1.00	0.16
is more interesting and effective	4.04	1.03	4.10	0.10	−0.24
Assessment					
Delivering online quizzes and exams is more	3.90	1.26	4.14	1.28	−0.86
Keeping track of student performance is smoother.	4.03	0.98	4.48	0.75	−2.58
The feedback provided is more convenient.	3.99	1.01	4.38	0.67	−2.53
Using online discussions and blogs as part of the	3.37	1.50	3.24	1.51	0.38
Grading is prompter and more immediate.	4.07	1.07	4.19	1.17	−0.45
Online assessment saves time.	4.13	1.15	4.10	1.26	0.11
Accessing grades online is more convenient.	4.25	0.98	4.29	1.01	−0.17
Submitting soft copies of assignments is better.	4.13	1.05	4.29	1.10	−0.61
Formative feedback is more useful than summative.	3.84	1.09	4.00	1.10	−0.65
Focusing on project-based assessment is more	4.02	1.02	3.86	1.46	0.49

Note. 1 = "Does not describe the course at all"; 5 = "Describes the course very well"

To answer Question 2 regarding differences due to gender, independent samples t-tests (Table 5) showed that all the variables related to interaction, motivation, and communication had significant differences related to gender in favor of female participants, except for the seven variables related to interaction. Additionally, three variables related to motivation did not show any significant differences due to gender.

Table 5. Interaction, motivation, and communication in the SML environment compared to

Variable	Male		Female		
	$\bar{x}$	SD	$\bar{x}$	SD	t.
Interaction					
Peer interaction helped students understand better.	3.87	1.26	4.15	0.97	−1.89
Learner–learner interaction was more effective.	3.98	1.13	4.12	0.97	−1.05
Learner–instructor interaction was more effective.	4.01	1.12	4.16	0.92	−1.11
Learner–content interaction was more effective.	3.96	1.17	4.14	0.89	−1.30
Learner–interface interaction was more effective.	3.73	1.04	4.07	0.91	−2.75**
Student–student interaction was appropriate and	3.69	1.20	3.94	0.98	−1.74
Learner–instructor interaction was appropriate and	4.04	1.16	4.14	0.86	−.748
Learner–content interaction was appropriate and	3.85	1.14	4.10	0.86	−1.89
Interaction in the course supported my learning.	3.76	1.16	4.21	0.85	−3.30**
Interaction methods were appropriate.	3.98	1.20	4.26	.859	−2.01*
Student engagement throughout the course was	3.81	1.04	4.09	0.92	−2.26*
Student engagement in class activities was high.	3.87	1.08	4.13	0.91	−2.06*
Motivation					
Students' interest in participation is more	3.79	1.15	4.14	0.87	−2.61*
The classroom activities are more motivating.	3.69	1.10	4.21	0.89	−3.97**
The classroom activities are more interactive.	3.74	1.15	4.14	0.91	−2.94**
Student motivation for learning increased during	3.64	1.18	4.10	0.93	−3.38**
Students' interest in the subject improved.	3.82	1.18	4.15	0.94	−2.36*
Students felt very comfortable with SML.	3.84	1.16	4.19	0.93	−2.57*
I would recommend others to take SML courses.	3.89	1.27	4.14	0.97	−1.63
I would like to take other SML courses.	3.74	1.26	4.05	1.00	−2.11
I prefer SML courses.	3.86	1.20	4.13	0.99	−1.94
Communication					
Effective use of virtual classrooms.	3.27	1.32	3.86	1.16	−3.77**
Effective use of wikis.	2.61	1.43	3.37	1.46	−4.33**
Effective use of threaded discussions.	3.07	1.40	3.61	1.39	−3.14**
The use of email is more productive.	3.91	1.13	4.20	0.96	−2.19*
Using communication tools (e.g., discussion	2.75	1.46	3.61	1.49	−4.80**
boards, blogs, and wikis).					

Note. 1 = "Does not describe the course at all," 5 = "Describes the course very well"

Table 6 displays the independent samples t-test for the males and females of the sample group to see if there were any significant differences in terms of perceptions of technology integration in the SML environment compared to traditional classes for each of the variables. The results showed significant differences between male and female students' perceptions, and female students showed slightly higher means in the all the variables than male students.

Table 6. Technology integration in the SML environment compared to traditional classes

Variable	Male		Female		
	$\bar{x}$	SD	$\bar{x}$	SD	t.
Using eTextBooks to enhance understanding.	2.85	1.48	3.23	1.57	−2.11*
Using a variety of software	3.76	1.16	4.17	0.94	−2.97**
Using several mobile apps	3.41	1.18	3.92	1.07	−3.63**
Technology-facilitated learning	3.81	1.15	4.17	0.95	−2.65**
More extensive use of the LMS	3.81	1.15	4.13	0.93	−2.54*
More effective use of Internet resources	3.96	1.17	4.44	0.75	−3.58**
Using multimedia was more prevalent.	3.69	1.22	4.25	0.92	−3.90**
Technology resources were available.	3.47	1.16	4.16	0.91	−5.08**
Using mobile devices more effectively.	3.78	1.18	4.20	0.86	−3.12**
Using flipped classroom technologies.	3.55	1.15	4.02	1.01	−3.40**
Using eTextBooks to enhance understanding.	3.41	1.23	3.90	1.03	−3.37**

Note. 1 = "Does not describe the course at all"; 5 = "Describes the course very well"

Table 7 displays differences between male and female participants in terms of perceptions of teaching strategies in the SML environment compared to traditional. The results showed significant differences in all variables, with the exception of three variables in the **general teaching strategies** caterogy, and seven in the assessment category. Generally, female students showed slightly higher means than male students did in all.

Table 7. Teaching strategies in the SML environment compared to traditional

Variable	Male		Female		
	$\bar{x}$	SD	$\bar{x}$	SD	t.
General Teaching Strategies					
The teaching strategies are interesting.	4.05	1.09	4.21	0.87	−1.27
The teaching strategies are motivating.	3.99	1.12	4.21	0.87	−1.66
The teaching strategies are varied.	3.94	1.02	4.22	0.90	−2.31*
The teaching strategies are student-centered.	3.89	1.05	4.11	0.90	−1.75
The classroom activities encourage	3.75	1.18	4.21	0.85	−3.31**
Course objectives are achieved better.	3.96	1.06	4.27	0.83	−2.45*
Cooperative Learning					
increased my interest in the subject.	3.65	1.25	4.15	0.89	−3.47**
enhanced my understanding.	3.69	1.15	4.12	0.96	−3.15**
was an effective technique.	3.71	1.14	4.20	0.88	−3.72**
was successful.	3.79	1.06	4.16	0.89	−2.95**
enhanced students' social skills.	3.84	1.16	4.20	0.87	−2.67**
enhanced low-ability students' learning.	3.53	1.22	3.91	0.10	−2.64*
fostered positive student attitudes.	3.66	1.12	4.15	0.88	−3.71**
helped students learn more.	3.60	1.20	4.15	0.89	−3.97**
is more interesting and effective	3.60	1.21	4.16	0.94	−3.10**
Assessment					
Delivering online quizzes and exams is more	3.95	1.33	3.90	1.25	0.34

Keeping track of student performance is	4.04	1.13	4.06	0.93	−0.21
The feedback provided is more convenient.	3.89	1.15	4.04	0.10	−1.09
Using online discussions and blogs is effective.	3.01	1.63	3.45	1.45	−2.27*
Grading is prompter and more immediate.	3.98	1.25	4.11	1.02	−0.89
Accessing grades online is more convenient.	4.16	1.13	4.27	0.93	−0.81
Submitting assignments online is better.	4.09	1.19	4.16	1.01	−0.43
Formative feedback is more useful.	3.59	1.24	3.92	1.05	−2.29*
Project-based assessment is more effective.	3.64	1.32	4.11	0.94	−3.10**

Note. 1 = "Does not describe the course at all"; 5 = "Describes the course very well"

To answer Question 3 in relation to the college attended, the results of the independent samples t-tests (Table 8) indicated no significant differences between students in the humanities and science colleges, except for seven variables. Three of these variables were associated with motivation (students' participation is more widespread, classroom activities are more motivating, and student motivation for learning increased during the course), and four were related to communication (various communication tools were used, effective use of wikis, effective use of threaded discussions, and the use of email is more productive).

Table 8. Interaction, motivation, and communication in the SML environment compared to traditional

	Humaniti		Science		
Variable	$\bar{x}$	SD	$\bar{x}$	SD	t.
Interaction					
Peer interaction helped students understand better.	4.16	0.93	4.03	1.13	1.27
Learner–learner interaction was more effective.	4.06	0.95	4.11	1.05	−0.47
Learner–instructor interaction was more effective.	4.12	0.86	4.14	1.05	−0.19
Learner–content interaction was more effective.	4.09	0.86	4.12	1.03	−0.29
Learner–interface interaction was more effective.	4.01	0.84	3.99	1.03	0.16
Student–student interaction was appropriate and timely.	3.91	0.93	3.87	1.11	0.40
Learner–instructor interaction was appropriate and timely.	4.06	0.85	4.16	0.98	−1.16
Learner–content interaction was appropriate and timely.	4.06	0.86	4.04	0.99	0.22
Interaction in the course supported my learning.	4.16	0.84	4.08	1.02	0.92
Methods used for interaction were appropriate.	4.21	0.83	4.19	1.03	0.18
Student engagement throughout the course was high.	4.05	0.93	4.02	0.97	0.34
Student engagement in class activities was high.	4.17	0.87	4.00	0.99	1.75
Motivation					
Students' interest in participation is more prevalent.	4.17	0.83	3.98	1.02	2.06*
The classroom activities are more motivating.	4.26	0.88	3.97	1.01	3.01**
The classroom activities are more interactive.	4.15	0.92	3.97	1.02	1.83
Student motivation for learning increased during the course.	4.18	0.84	3.86	1.11	3.23**
Students' interest in the subject improved.	4.16	0.92	4.02	1.06	1.40
Students felt very comfortable with SML.	4.15	0.94	4.09	1.04	0.60
I would recommend SML to others.	4.09	1.00	4.08	1.08	0.08
I would like to take other SML courses.	3.96	1.05	4.01	1.08	−0.54

I prefer SML courses.	4.11	1.01	4.05	1.07	0.64
Communication					
Effective use of virtual classrooms.	3.85	1.14	3.64	1.27	1.75
Effective use of wikis.	3.52	1.45	2.96	1.48	3.79**
Effective use of threaded discussions.	3.70	1.35	3.32	1.43	2.72**
The use of email is more productive.	4.26	0.88	4.04	1.08	2.21*
Using communication tools (e.g., discussion boards, blogs, and wikis)	4.20	0.86	3.95	1.03	2.55*

Note. 1 = "Does not describe the course at all"; 5 = "Describes the course very well"

Table 9 displays the independent samples t-test for the humanities and science colleges in the sample group to see if there is any significant difference in terms of perceptions of technology integration in the SML environment compared to traditional classes for each of the variables. The results showed that seven of the variables related to technology integration have no significant differences, whereas four of the remaining variables (using several mobile apps to enhance content, technology resources were available, using mobile devices made the course more effective, and using flipped classroom technologies enhanced teaching and learning) indicated significant differences. Besides, students in the humanities college showed slightly higher means in all the variables than students in the science college.

Table 9. Technology integration in the SML environment compared to traditional classes

Variable	Humaniti		Science		
	$\bar{x}$	SD	$\bar{x}$	SD	t.
Using eBooks to enhance understanding.	3.19	1.45	3.12	1.61	0.44
Using a variety of software to enhance content.	4.17	0.91	4.01	1.07	1.62
Using a number of mobile apps to enhance content.	4.00	1.01	3.67	1.16	3.07*
Technology-facilitated learning in and out of class.	4.16	0.96	4.05	1.04	1.05
More extensive use of the Learning Management System.	4.11	0.85	4.01	1.10	1.05
More effective use of Internet resources (e.g., videos).	4.40	0.75	4.29	0.97	1.28
Using multimedia was more prevalent.	4.14	0.94	4.12	1.07	0.18
Technology resources were available in this course.	4.13	0.87	3.92	1.10	2.08*
My perception of technology is more positive	4.18	0.85	4.06	1.03	1.28
Using mobile devices made the course more effective.	4.04	0.93	3.82	1.14	2.18*
Using flipped classroom technologies enhanced teaching and learning.	3.94	0.96	3.68	1.18	2.47*

Note. 1 = "Does not describe the course at all"; 5 = "Describes the course very well"

Table 10 shows the independent samples t-test for the humanities and science colleges to see if there is any significant difference in terms of perceptions of teaching strategies in the SML environment compared to traditional classes for each of the variables. The results indicated no significant differences except for six variables. One was associated with general teaching strategies (classroom activities encourage independence), and two were related to cooperative learning (more interesting and more effective than working alone). Additionally, three variables were associated with assessment (using online discussions and blogs as part of the course, formative feedback is more useful than summative, and focusing on project-based assessment

is more effective). Furthermore, students in the humanities college showed slightly higher means in most of the variables than students in the science college.

Table 10. Teaching strategies in the SML environment compared to traditional classes

Variable	Human		Science		
	$\bar{x}$	SD	$\bar{x}$	SD	t.
General Teaching Strategies					
The teaching strategies are interesting.	4.20	0.90	4.16	0.94	0.41
The teaching strategies are motivating.	4.18	0.86	4.14	0.98	0.49
The teaching strategies are varied.	4.19	0.91	4.14	0.94	0.54
The teaching strategies are student-centered.	4.12	0.88	4.02	0.97	1.02
The classroom activities encourage independent learning.	4.21	0.83	4.03	1.02	2.00
Course objectives are achieved better.	4.22	0.83	4.19	0.94	0.39
Cooperative Learning					
increased my interest in the subject.	4.13	0.89	3.97	1.08	1.6
enhanced my understanding.	4.01	0.98	4.05	1.04	−0.
was an effective technique.	4.18	0.86	4.03	1.03	1.6
was successful.	4.13	0.86	4.04	1.01	0.9
enhanced students' social skills.	4.20	0.86	4.06	1.02	1.4
enhanced low-ability students' learning.	3.80	0.99	3.85	1.11	−0.
fostered student positive attitudes toward the course.	4.14	0.87	3.96	1.02	1.8
helped students learn more.	4.09	0.10	3.99	1.05	1.1
is more interesting.	4.16	0.89	3.95	1.12	2.0
is more effective than working alone.	4.20	0.94	3.91	1.18	2.7
Assessment					
Delivering online quizzes and exams is more effective.	3.98	1.11	3.85	1.38	1.0
Keeping track of student performance is smoother.	4.09	0.88	4.03	1.04	0.6
The feedback provided is more convenient.	4.09	0.93	3.94	1.04	1.5
Using online discussions and blogs as part of the course.	3.65	1.34	3.12	1.58	3.6
Grading is prompter and more immediate.	4.18	0.96	4.00	1.16	1.6
Accessing grades online is more convenient.	4.27	0.87	4.23	1.06	0.4
Submitting assignments online is better.	4.20	0.88	4.09	1.18	1.0
Formative feedback is more useful.tive	4.00	0.97	3.73	1.18	2.5
Project-based assessment is more effective.	4.22	0.85	3.84	1.16	3.7

Note. 1 = "Does not describe the course at all"; 5 = "Describes the course very well"

To answer Question 4 relating to advantages of SML, Table 11 shows the advantages reported by students; for example, SML makes them more interested in learning (*n = 40, 10%), and helps them understand the content better* (*n = 21, 5%*). Additionally, SML makes instruction more useful (*n = 14, 4%*). Simiarly, students reported other advantages for SML including easy to communicate through (*n = 40, 10%*), learned new apps (*n = 83, 20%*), a method that improved their skills (*n = 30, 7%*), and motivating (*n = 33, 8%*). Further, several students revealed that SML helped them learn in creative ways (*n = 14, 4%*), it was time-saver (*n = 20, 5%*), and environmentally friendly, as it is paperless (*n = 15, 4%*).

Table 11. Advantages and benefits reported by students in SML classes

Categories	Frequency	Percent
Interesting.	40	10%
Helps to understand content.	21	5%
Instruction technique was very useful.	14	4%
Easy to communicate.	40	10%
Learning new apps.	83	20%
Improves my skills.	30	7%
Motivating.	33	8%
Easier to use.	13	4%
Learned using creative ways.	14	4%
Saves time.	20	5%
Paperless.	15	4%

6. Discussion

In terms of the variables connected to interaction, motivation, and communication, instructors and students recorded high means in most of the variables, showing enthusiasm for SML. Participants have the ability to adapt SML and enjoy using these methods (Hussin, Manap, Amir, & Krish, 2012). In terms of all the variables related to technology integration, instructors recorded slightly higher means in most variables than the students. With increasing access to technology, instructors and students are using tactics that offer flexibility, dynamic sharing, and understanding (Huh & Reigeluth, 2018; Utami, 2018). Technology is moving education from instructor-centered to student-centered. In terms of all the variables connected to teaching strategies, instructors documented slightly higher means in most of the variables than the students. However, instructors do not necessarily have adequate abilities in SML (Somera, 2018).

In terms of all the variables related to interaction, motivation, and communication in the SML environment compared to traditional classes, female students showed slightly higher means than male students. Further, the results showed significant differences between male and female students' perceptions, and female students showed slightly higher means in the all the variables than male students. As regards variables associated with teaching strategies in the SML environment, female students showed slightly higher means than male students. Student satisfaction with higher education, regardless of gender differences and views on SML, is positive.

As regards the differences between the perceptions of SML for teaching and learning due to the college attended, students in the humanities college showed slightly higher means in all the variables related to the classroom environment and the integration of technology than students in the science college. When students are more involved in SML, learning satisfaction with new

technology is better (Simmers & Anandarajan, 2001). Another notable finding of this study is that students in the humanities college consistently rated the use of SML components more favorably than students in the science college. This might be because of the higher number of females in the humanities college.

The advantages of SML are unlimited. Implementing new ideas can be difficult, but technology can provide innovative avenues for teaching. Students stated several advantages of SML; for example, they said, "We can use our imagination by watching videos, and that made the course easier to understand, attractive, and interesting." Another student stated, "It has increased my interest in agriculture to the extent that I am planning to start my own business in the sector. It was a good experience with a variety of learning techniques." These findings agree with El-Hussein and Cronje (2010) who stated that SML have improved accessibility to information in networks, helped students learn in various locations, and improved communication and collaboration.

7. Conclusion and recommendations

In conclusion, this study clarifies that there are important variances between students' and instructors' perceptions as regards SML in teaching. It is necessary to be flexible to permit the implementation of SML and to create a balance between these methods and traditional face-to-face strategies. Additionally, this method should be implemented for all students in higher education.

This study evidenced the feasibility and effectiveness of SML in the educational process and demonstrated the reflection of these methods on the quality of educational outputs as well as the imparting of skills, experiences, and knowledge. The use of such technologies in the service of education is a means of bolstering the educational process, transforming pedagogy from mere indoctrination to creativity, interaction, and skill development. However, further research on the use of SML in other domains, such as field training and practical courses, is recommended for the attainment of intensive and comprehensive information on such integrations. The study also demonstrates the need to review programs, curricula, and implementation strategies to better apprehend the impact of technology integration in classrooms. Thus, stakeholders should develop a set of measures and guidelines to regulate the process of using SML in social communications within the educational system. Finally, future research projects employing qualitative data collection methodologies are strongly suggested.

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