Socially-Motivated Discussion Forum Models for Learning Management Systems

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ABSTRACT

This paper seeks to contribute to the field of learning management system (LMS) development in tertiary education institutions, in particular, to advance the adoption of LMSes by exploring the incorporation of appropriate socially-motivated discussion forums. This study uses a Web-based application, which implements four different discussion forum models for learning management systems (LMSes), in order to test usability and student preferences. Two non-social discussion forums and two social discussion forums were compared, to determine their appropriateness in terms of attributes or features and general functionality for LMSes. The design processes led to the creation of a Web-based application called 4DFs that includes implementations of all discussion forum models. Two of these models are non-social discussion forums: the chat room unstructured model and the traditional general threaded discussion. The other two types are social discussion forums, where users can choose who they converse with: the Twitter-style short comment feed and the Facebook-style hybrid post and reply. A controlled experiment was conducted with 31 students from the institution. The study found that students preferred that the learning forum includes certain characteristics - they prioritised ease of use, low complexity, less interaction and a user-friendly interface over their familiarity with the forum. For learning, there is a need to use the features for a specific purpose so users do not necessarily want non-essential features like emojis; instead they want systems that help them to learn efficiently.

CCS CONCEPTS

•Applied computing → Education; Learning management systems;

KEYWORDS

Learning management system, social network sites, chat room, discussion forums, collaborative learning

1 Introduction

Learning Management Systems (LMSes) are Web-based tools used for the management and administration of courses [1]. They have increasing use and significance, especially in higher education [2]. The LMS should provide tools for synchronous and asynchronous communication, development and delivery of content, summative and formative assessment, and user and class management [3]. The exploitation of student autonomy, motivation and creativity is possible because of the synchronous and asynchronous communication that is enabled through the use of applications, such as chat platforms and discussion forums, as main features of LMS platforms used to communicate. Chat rooms and discussion forums offer benefits to the students' learning. For example, they are beneficial tools used to document students' efforts and contributions during classes [4]. On other hand, Facebook has become one of the most popular Social Network Sites (SNSs) amongst youngsters and adults around the world [5]. Facebook was originally created to support university students' communication [6]. Many university students have used Facebook for their social lives, to blend their social and learning spheres together, and many teachers use Facebook to enhance learning [5]. Facebook is also widely used at the University of Cape Town (UCT). At UCT, lecturers and students generally recognize the value of the site in terms of teaching and learning processes [7]. Moreover, Twitter - a microblogging site - is one of the many SNSs that allows users to send and receive short posts [8]. Twitter has been used for student-teacher communication and for student-student interaction, inside and beyond the classroom [9].

SNSs offer opportunities to enhance learning [10]. In particular, Twitter has a lot of potential to support teaching and learning activities [11]. Facebook is also an immensely popular SNS and often a part of learners' daily activities. Many students wish to use SNSs more often in their education [12]. Also, LMS and social media platforms have become a necessity in many higher education institutions [13]. LMSes are platforms that stimulate discussion and allow users to share resources and materials digitally and efficiently, which students can relate to. LMS tools are not as popular as SNSs, but SNSs are not created for learning purposes [13]. UCT students rarely use the chatrooms and discussion forums on Sakai to communicate, and instead engage more with Facebook than with university LMSes [7].

Since SNSs were not initially created for learning purposes, it often leads to teachers having a lack of control. There is the additional sentiment that students and teachers might prefer to keep their personal and academic lives separate [14]. These issues partly informed a demand for dedicated e-learning Web-based applications with social media features [14]. This demand stemmed from the ideal that integrating SNS features with LMSes would encourage online community development and promote collaborative learning [15]. As the bridge between the LMS and the SNSs features is crucial [16].

The aim of this study is to compare four different discussion forum models, to determine their appropriateness in terms of their particular features and functionality in general for LMSes.

The main research questions are:

- Which of the four discussion forum models (the chat room unstructured model, the traditional general threaded discussion format, the Twitter-style short comment feed and the Facebook-style forum) do the users prefer for LMSes?

- What features in the four discussion forum models should be included in an ideal discussion forum to support learning?

2   Relevant literature

Most higher educational institutions around the world are concerned about how to increase students' learning engagement through interactivity and collaboration. There have been many attempts to engage students and enable them to share knowledge and benefit one another, not only in the classroom but also outside of the classroom. There are four major themes of communication tools that are widely used in education, which are LMSes, chat rooms, discussion forums (DFs), and SNSs.

2.1 Learning management systems

According to Sharma and Vatta [17], LMSes have been widely adopted in educational institutions, especially universities. LMSes are available as proprietary or freeware products, but all have the same features and tools for pedagogical functions and course management [18, 19]. Zhang and Wang [20] mentioned that there are many features found in most LMS applications: synchronous communication, asynchronous communication, file exchange, workgroups, and whiteboards. There is limited discussion on the utilization of the tools of LMSes; Coates et al. [3] showed that some of the features of LMSes have not been fully utilized, such as the communication tools. Despite offering an effective way for collaborative learning, there are some difficulties that users might face while they are working with LMSes [21].

2.2 Chat room

The chat room is a means of Computer Mediated Communication (CMC) that allows users who are online at the same time to exchange posts synchronously [22]. Three main features can be specified in the chat rooms layout: the first feature is an area that enables the user to type a post and share it with other users. The second feature is a list of users, indicating who is online and available for communication. The last feature is an area displaying a record of sent posts [23].

Chat rooms can be used to facilitate faculty-student communication in online learning and teaching. A frequently occurring challenge of using chat rooms is that it is not easy to set a time that is agreeable to all members of a group of students [22]. Chat rooms are also problematic in that it can become confusing for the user; for example, it becomes difficult to follow the discussion when there are a large number of users posting at the same time, and it is often difficult to recognize who is communicating with whom and about what [23].

2.3 Discussion Forums in Learning

As a means of CMC, discussion forums (DFs) allow users to post questions and comments alongside replies to other users' posts [24]. DFs have become an important tool to mediate and facilitate asynchronous communication in different areas such as business and education. The different types of DFs include news forums, threaded discussions, and question and answer forums [25]. The common features found in most DFs include the posting of messages, replying to messages, viewing messages, and searching for messages [26]. The discussion board in a DF arranges the posts as an asynchronous thread; as a result users need to refresh the page to see the latest posts [22]. DFs generally arrange the posts in chronological order. The user begins the discussion by posting an initial post to which other users comment or respond. The resulting list of posts is threaded, and using the tree style, the conversations are branched off [27].

Many studies have found that DFs are effective communication tools in various modes of learning and teaching. Despite their widespread use, discussion forums also face some barriers, as expressed by different authors. Yang [28] notes that language and the organization of a mass of posts are some of the most common barriers experienced in the use of discussion forums in MOOCs. According to Xia et al. [29], it is highly likely that students might also find discussion forums to be impersonal, confusing, and disconnected. Also, normally users do not get immediate feedback to their questions, but often only get responses from other users when they login again at a later stage [30].

2.4 Social Network Sites for Learning

Social Networking Sites (SNSs) are platforms that allow any users on the Web to build social network connections and share their activities, interests, or real-life connections [31]. Various studies show that SNSs are popular among students and instructors in various educational institutions, although they are not often used for educational purposes. Research conducted by Santos et al. [32] shows that most university students in Singapore use SNSs primarily for social interactions, while Brazilian university students use them for social interactions as well as for discussing their studies. These findings are supported by Gulbahar [33], who concludes that students currently use tools such as Facebook, Twitter, and Blogs for social interaction and communication purposes, social sharing, gaining information, and knowledge sharing. Tiryakioglu and Erzurum [34] suggested that it was not possible for instructors to conduct full courses on SNSs, but this development should not be ignored. Zaidieh [35] identifies four benefits of the use of SNSs in education, which are flexibility, repeatability, convenience, and accessibility. SNSs provide flexibility by expanding the choices on what, where, and how learning can take place. They also provide opportunities for information to be retrieved repeatedly and are convenient in terms of accessing, reviewing, updating, and editing information. Social media has been used as an LMS to make teaching and learning more effective and interesting [36]. Also, Students preferred using social media as compared to LMS in a comparative study on higher education students' perception of using LMS and social media for academic purposes [37]. However, Some of the setbacks that Zaidieh [35] mentioned include privacy issues, time wastage, and fake relationships. Drosos et al. [38] indicated that SNS users who spend many hours on the SNSs in their free time are liable to losing real connections. Facebook and other SNSs were not initially created for learning purposes, which often leads to teachers having a lack of control. However, SNSs afforded interactive features and convenient discussion spaces that not supported by LMS [13]. This issue has partly informed a need for dedicated e-learning applications within social media tools [14].

The study reported on in this paper contributes to research by comparing four different models of discussion forum to determine students' preferences in terms of particular features and functionalities of DFs for LMSes.

3 Material and methods

3.1 Design of discussion forums experimental platform

Using focus groups in a user centered design approach, a Web-based application was designed, which incorporated various features of the four different discussion forum models. Two of these models are non-social discussion forums: the chat room unstructured model (DF1) and the traditional general threaded discussion (DF2). The other two types are social discussion forums, where users can choose who they converse with: the Twitter-style short comment feed (DF3) and the Facebook-style forum (DF4). Together, these applications are called the Four Discussion Forums (4DFs).

3.1.1 DF1 design.

The DF1 model is the chat room unstructured model, which was designed based on the chat room that is found on Sakai. The chat room is a real-time communication tool. It allows users to see other users who are also signed in to the site at the same time, enabling them to have an unstructured conversation synchronously (see Figure. 1).
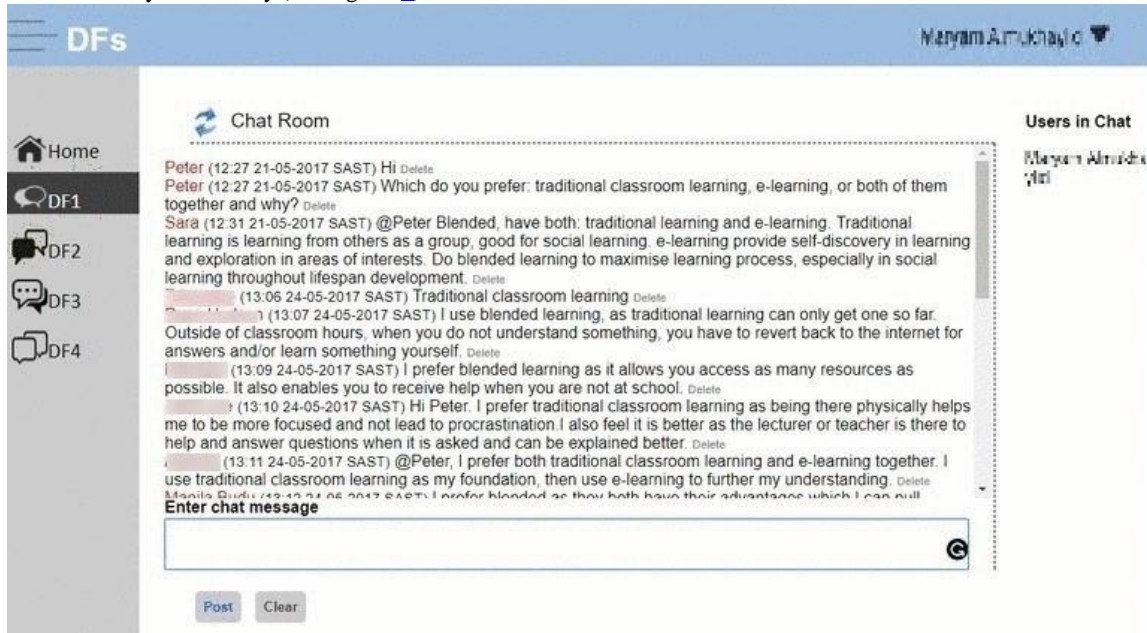

Figure 1: DF1 design

3.1.2 DF2 design.

The DF2 model is the traditional general threaded discussion, which was also designed based on Sakai. As an asynchronous messaging platform, it allows a user to create a conversation, whether new or old users, can then engage with at any time and at any point in the conversation (see Figures . 2 and 3).

Figure 2: DF2 design

Figure 3: DF2 design

3.1.3 DF3 design.

The DF3 model is a Twitter-style short comments feed, which was designed based on some of Twitter's design features (see Figure. 4)

Figure 4: DF3 design

3.1.4 DF4 design.

The DF4 model is the Facebook-style forum, designed based on some of Facebook's features (see Figure. 5).
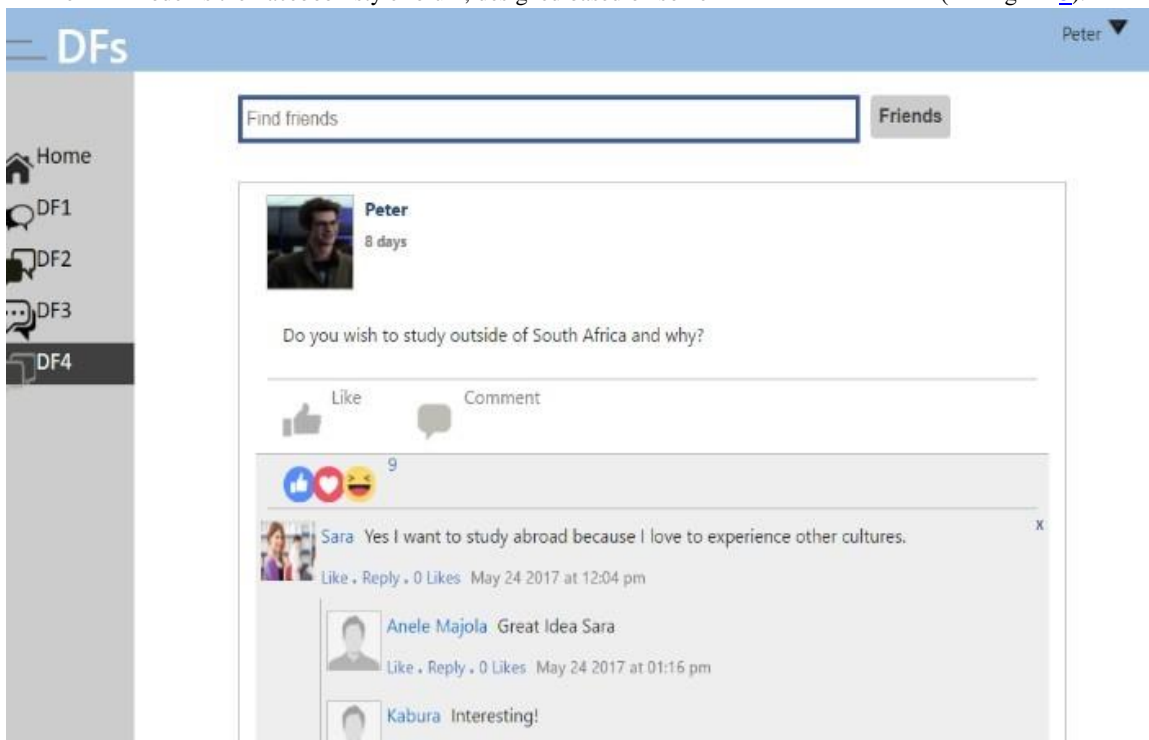

Figure 5: DF4 design

3.2 Evaluation

3.2.1 Study participants.

The Web-based application aims primarily to assist UCT students to communicate with others in more effective and efficient ways. This objective can be realized through a comparison of four different discussion forum models in LMSes, to identify which of the features might be conducive to interactive, collaborative and constructive student learning. UCT was selected as the research site since the researcher herself is an UCT student. This

has facilitated fieldwork convenience and on-the-ground understanding of issues students face concerning LMSes in the UCT environment. The participants had to be current UCT students at the time of the experiment. All UCT students received an email invitation to participate in the research. Students who wanted to participate were required to fill in an online form. This form introduced the purpose of the research, as well as the dates and times of the experiment. Google forms was used for collecting the participant data because it gives the researcher individual and aggregated results. 180 students asked to join this study from across all faculties. 36 students were invited to participate using stratified sampling and simple random sampling. Firstly, students were divided into six groups since UCT has six faculties. A group of students was then invited from each faculty. 35 students from UCT participated in this experiment. 31 of these students completed all the tasks. A total of 25 Bachelor's degree students, four Honours degree students, and two Master's degree students were included in the study and the number of participants who completed all the tasks was 31.

3.2.2 Experiment design.

In order to achieve the aims and answer the research questions, controlled experiments were used. Controlled experiments are a widely-used approach in human-computer interaction research, and are used to evaluate interfaces and to understand cognition in the context of interactions with systems [39]. The study adopted a within subjects design because the aim is to compare the preferences each participant has of the 4DFs while they were doing the requested tasks. Participants were asked to do different tasks using all the discussion forum models, to ensure that they used all the features in all the models. In this controlled experiment the interaction of the students with the discussion forum models was measured. The independent variable was the type of discussion forum (treatments) and the dependent variable was the user's preferences. To avoid bias in the participants' choosing of discussion forum models, the research was conducted with a Counterbalanced Measures Design [40]. Since this study has four possible models (treatments), the maximum possible number of orders for using the discussion forums was 24. The formula used to reach this maximum is 4x3x2x1 (see Figure. 6).
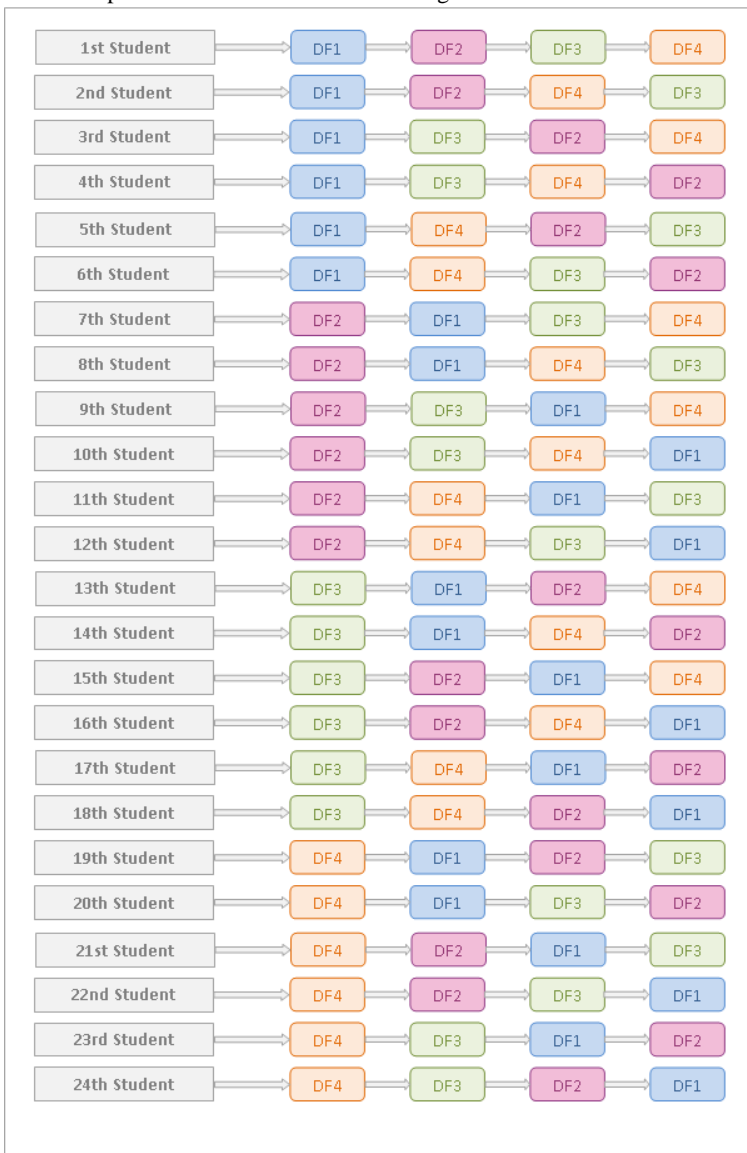

Figure 6: The order of discussion forums used by participants in the experiment

3.2.3 Experiment procedure.

At each experiment session, the procedure was as follows:
i.   The researcher introduced the purpose of the study and explained what was expected of the participants.
ii.   Participants had to sign consent forms as agreement of their participation.

iii.   At the beginning, participants were required to fill out online background information surveys (pre-tests). This lasted 2-4 minutes.

iv.   Participants had to visit the 4DFs pages and sign up as new users.

v.   Participants had to complete the tasks that requested them to use each discussion forum then fill out the System Usability Scale's (SUS) ten questions. They completed these questions four times in four online questionnaire sections, to test the usability of DF1, DF2, DF3, and DF4.

vi.   The participants then filled out their preferences for the discussion forums questionnaire. This lasted 2-4 minutes.

vii.   For completing the experiment, participants were offered monetary compensation of 50 Rands each.

viii.   The sessions were then closed.

3.2.3.1 The 4DFs tasks

Table 1 shows that different questions and tasks were set and used across the forums, to ensure that each student used all the features of the different discussion forum models. This experiment focused on user preferences for the different forums. Different questions were posted to each discussion forum. The questions set on the discussion forums were open-ended to encourage the participants to be more subjective by expressing their own knowledge, feelings and experiences. Participants were asked to communicate with three fake users named Peter, Sara, and Lara. Every participant was included in all the experiment groups. Participants had to use all four systems, in different sequences, to avoid any bias. The purpose of using a SUS questionnaire was to test the usability of DF1, DF2, DF3 and DF4, and since it is an evaluation tool and known standard to measure usability when comparing users' performance while using different systems [41].

Table 1: Experiment groups' tasks

The main Tasks	The questions posted in DFs	DFs tasks	Survey
Using (DF1) The chat room unstructured model (experiment group)	- Which do you prefer: traditional classroom learning, e-learning, or both and why?	- Answer the question that Peter posts. - Reply to Sara. - Delete your reply to Sara.	Fill in the SUS questionnaire
Using (DF2) The traditional general threaded discussion (experiment group)	-What do you love most about UCT? -What would you like to be in the future?	- Answer the question that Peter posts. - Reply to Sara. - Create a new conversation. - Reply to Lara's conversation. - Delete your reply to Lara's conversation.	Fill in the SUS questionnaire
Using (DF3) The Twitter-style short comment (experiment group)	- What are your suggestions for the development of education in the University of Cape Town?	- Post a message using the hashtag #UCT - Search to find Peter's profile. - Follow Peter. - Reply to Peter's post. - Search for the hashtag #UCT - Repost Sara's reply to Peter. - Like Peter's post.	Fill in the SUS questionnaire
Using (DF4) The Facebook-style (experiment group)	- Do you wish to study outside of South Africa and why?	- Search for Peter's profile. - Add Peter as a friend. - Reply to Peter's post. - Reply to Sara on Peter's post. - Use any like emoji on Peter's post. - Post a new message on your page. - Delete your post.	Fill in the SUS questionnaire

3.2.3.2 Post questionnaire

This section asked participants questions about their preferences of the discussion forum models and the reason for their choices. They were then asked to rate their preference of the different features, on a scale of 1 to 5 - 1 being not beneficial and 5 being beneficial. These features of the 4DFs included the post button, the like button, the repost button, the reply button, the edit button, the search button and having a profile picture. They were also asked for their opinion on which features they considered the most positive or negative, and what they would suggest as beneficial to the ideal discussion forum.

4   Results

This study had four experimental groups and every participant had to take part in all of these experimental groups. Each participant was first introduced to the purpose of the research study. Participants were distributed into groups based on the order in which they received the copies of the different 4DFs, using a counterbalanced design to avoid bias. Some students had to use the same order as other students, because the maximum possible number of orders for using the discussion forums was 24.

4.1 Usability of discussion forums

The System Usability Scale (SUS) was used to test the usability of the four types of discussion forums. Table 2 shows the mean scores of DF1, DF2, DF3, and DF4. Many studies have indicated that the average score for SUS is 68 [42]. The mean values for DF1, DF2, and DF3 were above average in terms of usability, while DF4 was lessthan average in terms of usability.

Table 2: SUS scores for the discussion forums

Type of Discussion Forum: DF1 (The Chat Room Unstructured Model)		
Code	**Number of participants**	**Examples**
Ease of use	8	X1 said, *"It was the easiest for me to use"*
Preference of the layout	3	X9 said, *"The ability to see what other people are posting and who they are interacting with is interesting because it shows you what type of post is attractive, why and how."*
Meeting the learning requirements	1	X31 said *"It is the most efficient forum, which meets my needs in a learning context well."*

4.2 Preferences of discussion forums

Participants were asked some open-ended questions to understand their perspectives. Their responses were coded using the open coding method. The data was read to break down the words analytically to find the phenomena, then the conceptually similar phenomena were grouped into categories [43]. For the first open-ended question, participants were asked about the reasoning behind their preferences. Table 3 shows three different codes of reasons that were determined based on participants' responses for choosing DF1: ease of use, preference of the layout, and meeting the learning requirements. Also, Table 3 presents the number of participants, and some examples of their reasons. Of the 12 participants who preferred DF1, 8 preferred DF1 because it was easy to use and 3 participants preferred its layout.

Table 3: Participants' reasons of choosing DF1

SUS Score								
Type of Discussion Forums	Number of Participants	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
DF1	31	76,532	20,4601	3,6747	69,027	84,037	0,0	100,0
DF2	31	68,306	23,6413	4,2461	59,635	76,978	20,0	100,0
DF3	31	69,839	22,5364	4,0477	61,572	78,105	15,0	100,0
DF4	31	48,710	28,3348	5,0891	38,316	59,103	0,0	100,0
Total	124	65,847	25,8157	2,3183	61,258	70,436	0,0	100,0

Table 4 shows three different codes of reasons that were determined based on participants' responses for choosing DF2: ease of use, preference of the layout, and direct reply feature. Also, Table 4 presents the number of participants and some examples of their reasons. Of the 12 participants who preferred DF2, 9 preferred it because it was easy to use and 2 preferred its layout.

Table 4: Participants' reasons of choosing DF2

Type of Discussion Forum: DF2 (The Traditional General Threaded Discussion)		
Code	**Number of participants**	**Examples**
Ease of use	9	X28 said, *"It was the easiest and had the most logical flow"*
Preference of the layout	2	X7 said, *"The way in which they display post, and the way they designed and showed the information appealed to me."*

| Direct reply feature | 1 | X27 said, *"it had direct replies to people instead of using the @ with the DF1 forum."* |

Table 5 shows three different codes of reasons that were determined based on participants' responses for choosing DF3: ease of use, familiarity, and interactivity. Also, Table 5 presents the number of participants, and some examples of their reasons. Of the 13 participants who preferred DF3, 9 participants preferred it because it was easy to use and 3 preferred it because they were familiar with this forum.

Table 5: Participants' reasons of choosing DF3

Type of Discussion Forum: DF3 (The Twitter-Style Short Comment Feed)		
Code	**Number of participants**	**Examples**
Ease of use	9	X21 said, *"it was easy to engage with everyone in this discussion forum and it was not complicated to use unlike the others"*
Familiarity	3	X4 said, *"I am familiar with this forum."*
Interactivity	1	X11 said, *"This DF was simple to use and visually appealing, and felt more like an interaction with other people as opposed to just typing text."*

Table 6 shows three different codes of reasons that were determined based on participants' responses for choosing DF4: simple to use, familiarity, and preferring the layout. Also, Table 6 presents the number of participants and some examples of their reasons. Of the 7 participants who preferred DF4, 5 preferred it because they were familiar with this forum, 2 preferred it because it was easy to use and 2 preferred its layout.

Table 6: Participants' reasons of choosing DF4

Type of Discussion Forum: DF4 (The Facebook-style)		
Code	Number of participants	Examples
Familiarity	5	X25 said, *"I use Facebook everyday so the interface is familiar to me."*
Ease of use	2	X22 said, *"They are easy to use."*
Preference of the layout	2	X7 said, *"The way in which they display post, and the way they designed and showed the information appealed to me."*

Concerning DF1, DF2 and DF3, participants preferred the usability of these forums. However, most of the users who preferred DF4 were familiar with the forum and did not choose it for its usability.

4.3 Features of discussion forums

Knowing participants' preferences of what features used in the four discussion forum models should be included in an ideal discussion forum to support learning is the second major question in this study. To this end, participants were asked to rate, from 1 to 5, the features that they used in order to interact with the discussion forums; with 1 meaning not beneficial and 5 meaning beneficial. Table 7 shows participants' ratings of the features. The average of participants' ratings of the post button, reply button, edit, delete, and search button were more than 4.5 out of 5; that means that these features are highly preferred. Participants also emphasised the benefit of the like and repost buttons. Participants rated the profile picture and using the emojis on average around 3.6 out of 5, which is more than average but is not as highly preferred as other features.

Table 7: How participants rated the features of 4DFs

Features	1 (Not Beneficial)	2	3	4	5 (Beneficial)	Average
Post button	0%	0%	0%	19,4%	80,6%	4.8
Like button	9,7%	3,2%	6,5%	32,3%	48,4%	4.06
Repost button	3,2%	9,7%	9,7%	25,8%	51,6%	4.12
Reply button	0%	3,2%	3,2%	9,7%	83,9%	4.74

Edit button	3,2%	3,2%	3,2%	19,4%	71%	4.51
Delete button	3,2%	3,2%	0%	12,9%	80,6%	4.64
Search button	0%	0%	0%	6,5%	93,5%	4.93
The profile picture	9,7%	6,5%	29%	19,4%	35,5%	3.64
Emojis	9,7%	12,9%	16,1%	29,0%	32,3%	3.61

5 Discussion

Quantitative and qualitative data were collected from students through an online questionnaire. The background results indicated that participants were using chat rooms, discussion forums and social networking sites for non-university related purposes more than for university related purposes. It is also indicated that, in terms of education, they were using SNSs to communicate more than they were using chat rooms and the discussion forums that are found on theLMSes.

In this study, for the comparison of usability of discussion forums, the mean SUS scores had no significant differences for DF1, DF2, and DF3. However, there were significant differences between the mean SUS scores of DF1, DF2 and DF3 and the mean SUS score of DF4. This shows that DF1, DF2, and DF3 were more usable than DF4. The outcome of this study suggests that there is no clear winner in terms of one particular forum model, but there are special reasons why users chose certain discussion forums over others. DF3 (the Twitter-style short comment feed) was preferable in terms of its ease of use and since participants were familiar with it. This was followed by DF1 (the chat room unstructured model) and DF2 (the traditional general threaded discussion), both of which were again favoured for their ease of use and for students' preference of their layout. DF4 (the Facebook-style) was least favoured in terms of usability and preference. Participants who preferred DF4 mentioned that their familiarity with this system was the reason they chose it, more so than for its ease of use.

The study found that students preferred that the learning forum include certain advantages; they prioritised ease of use, low complexity, less interaction and a user-friendly interface over their familiarity with the forum. To illustrate this outcome, for DF1, DF2 and DF3 most students who chose these forums mentioned that these forums were easy to use and were not complicated. Also, it was not observed that any students had an issue using these three forums during the experiment. For DF4, only a few students mentioned that the forum was easy to use. Moreover, around 60% of students who preferred DF4 said they preferred DF2 simultaneously, because both have similar ways of displaying the posts and replies; students liked the ability to directly reply to users. In terms of discussion forums for learning, students wanted clear direction, to be able to get to the objective quickly and easy access to all necessary features. Students indicated that the post, reply, edit, delete, and search buttons were the most beneficial features. Also, participants emphasized that the reply button was the most positive feature that they used while using the discussion forums. On the other hand, some participants mentioned that the layout of DF1 was not optimal, since the massive amount of text made it confusing and unclear for them to decipher. Furthermore, some of them mentioned that using the emojis are not necessary on DF4, whereas there is a need for extra buttons that would make it easier to use. Participants suggested additional features to include uploading media, allowing private chats, adding extra features for important posts, and a repost button for the discussion forums. The findings indicated that all the fancy features (e.g. the profile picture, emojis, etc.) did not appeal to the students. There were some students who liked the emojis, but the majority of the participants did not like the fancy features. Normally, for learning-related discussions students have questions they want answers for and so they do not want to spend much time in the discussion forums. 80.6% of students said they were using Facebook in their social lives, a forum that has lots of interaction and where they use the profile picture feature, the like button and emojis. In contrast, in the learning environment students prefer the forums that are easy to use and that have less interaction, which they value more than familiarity. Also, they prefer to use necessary features that help them to reach their objective easily.

6 Conclusions

This paper presented a study of different social and non-social discussion forum models to investigate user preferences for models and features in the context of learning. There was no single simple preference of all users, but there was an inclination of users to favor ease of use and simplicity. Users wanted the ability to reply effectively to prior posts, but were not as interested in the typical social features found in social networking sites, such as emojis. SNSs include many features to foster engagement but students who are already engaged with learning do not appear to need these. However, the ease of use and simplicity features could inform the design of future learning-oriented discussion forums. Moreover, the evaluation demonstrated that learners have different expectations when learning and learning-focused features are preferred over those features intended purely to develop communities.

For future work there are still possible study areas that could be explored; conducting this study with teachers is possible. Future study could be carried out by more participants from different universities and while using different devices. Moreover, it could be beneficial to conduct this study for Massive Open Online Course (MOOC) users, since these users are especially dependent on online learning to get a variety of perspectives. Further studies could be conducted to test the effectiveness of the chat room and discussion forums, on Sakai or other LMSes, for higher education purposes and to understand the reasons why students rarely use the communication tools on LMSes. Also, a comparison between the usefulness of the different features of discussion forums for long term learning periods can be made.

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