Comparison of Learning Management Systems and Social Media Sites for Delivery of Learning Resources in Saudi Universities

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LIST OF ABBREVIATIONS

CMS   Course Management System

E-Learning   Electronic Learning

KSU   King Saud University

LMS   Learning Management Systems

PNU   Princess Nourah bint Abdulrahman University

SNS   Social Networking Site

WEKA   Waikato Environment for Knowledge

ABSTRACT

Recently, many Saudi universities have started to adopt learning management systems (LMS) and some types of social media in their education systems. These LMS are to provide study and learning resources, assessments and the necessary tools to students. Universities have also started to use some types of social media for the same purpose. This research aims to compare LMS and social media and determine the most beneficial way for Saudi students to access study and learning resources. It investigates the problems and barriers that may affect the use of LMS or social media to deliver learning resources in universities.

This research used an exploratory qualitative and quantitative design, utilising a descriptive questionnaire as its main methodological instrument to define the feature of LMS or social media used in Saudi universities. This research is one of the first studies dealing with different means of delivering learning resources in Saudi universities. The number of participants was greater than expected. In total, 452 students from two different universities participated by completing a pre-filled questionnaire administered online. This study used data mining software to define the association rules between using LMS and social media to deliver learning requirements in Saudi universities. Both universities provide known LMS products, which have efficient features for learning activities. These universities also provide some types of social media for the same purpose.

The results were counter-intuitive. The association rules between using LMS and social media show that there are weaknesses of using the given features of LMS for the study requirements. Further, it illustrates that the majority of students knew how to use LMS and social media, and were satisfied using them for learning activities. However, students undertake most learning activities using email, such as submitting assignments, receiving announcements and communicating with teachers. Students used social media more than LMS to communicate with each other. Students were uneducated about privacy and the security weaknesses of social media and email. Teachers' encouragement of LMS use was the main factor affecting the use of LMS.

The use of LMS in Saudi universities requires further research in order to determine the barriers that were the reason for the lack of LMS use. The outcomes of the research will help faculty in Saudi universities know the current use of LMS and social media, as well as to consider the preferred way for students to undertake learning activities. In addition, the outcomes will assist universities in developing the use of LMS and social media, in order to deliver learning resources to students.

DECLARATION

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for the degree of Master of Science (Computer Science) at Flinders University; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person, except where due reference is made in the text.

Signed...

Date 13 June 2016

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1. INTRODUCTION

1.1 Overview

Learning management systems (LMS) is one of the efficient and effective means to support distance education and the use of LMS has became an imperative. Particularly, LMS utilized by educational institutions such as schools, universities, and the major focus of LMS is managing the education process. LMS provide academic mechanisms and tools to store and share its academic resources. In addition, LMS improves the effectiveness of communication between students and their teachers (Al-Busaidi and Al-Shihi 2010). Recently, some academic institions started to use social media sities in the learning process. Some social media sites have the features that could help student to do the leaning activities.

This research compares the use of learning management systems (LMS) and social media sites for the delivery of learning resources in Saudi universities. It will define the problems and barriers affecting the use of LMS and social applications by students in Saudi universities. Research data were collected from two Saudi universities through a survey. This thesis is one of the first studies that deals with different means of delivering learning resources in Saudi universities, such as LMS and social media sites. The outcome of the research will help overcome barriers affecting the use of LMS and social media in delivering learning resources in Saudi universities. The aim was to identify the useful features of LMS and social media that help students access their learning materials.

The structure of this thesis as following: The first chapter is to give an overview of the research for instance: research questions, and limitations and significance of the study. The second chapter is the literature review that outlines the background of the study and discusses the related research of using LMS and social media to deliver learning resources. Chapter 3, methodology, includes the study design, survey instrument, and the process of data collection and analysis. The fourth chapter provides the results of the study which includes the statistical results and the association rules. Chapter 5, provides a discussion of the results, discusses the barriers and factors of using LMS and social media in Saudi universities. The last chapter summarises the study by giving a conclusion, recommendation, and future work.

1.2 Research Questions

The main three questions guiding this research were:

- What are the problems and barriers that students may face when using LMS and/or social media to find learning resources?
- Which is the most beneficial way for Saudi students to access study and learning resources?
- Are there any factors that affect the use of social media in Saudi universities?

1.3 Limitations of the Study

This research has three main limitations. First, there are limited studies in the field of the use LMS and social media in Saudi universities. Consequently, the literature review of this research expanded to include the experiences of other nations. Second, this research is examined the barriers and factors of the use of LMS and social media to deliver learning resources from the perspective of students. The outcomes of this research do not include all the barriers and factors from other perspectives. Third, the collected data were Arabic data that were difficult to enter into Waikato Environment for Knowledge (WEKA) software, which required translating the data to English language.

1.4 Significance of the Study

Some previous research has discussed the implementation of LMS in Saudi universities and some barriers that concern the faculty. This research has discussed the different means of delivering learning resources. The recommendations in this project will assist Saudi university administrators to develop the use of LMS and social media. This research aims to know the barriers and factors of the underuse of LMS and social media to deliver learning resources in perspective view of student.

The main contribution of this study is defining the means that students used to do learning activities. Also, this study discusses some of barriers and factors that cause the limitation of the use of LMS or social media. This study found different means that students used them if their universities do not provide LMS or social media.

2. LITERATURE REVIEW

2.1 Literature Review

This literature review will first discuss some studies that have been important to the field of LMS as a learning resource, and then will discuss some studies related to the use of social media as an educational tool. Finally, this chapter will compare the use of LMS and social media for delivering learning resources.

2.2 The Current Delivery of Learning Resources in Saudi Arabia:

There are many studies which have discussed the utilization of online learning tools in Saudi universities. Currently, there are two main approaches for the learning system in Saudi universities. The traditional teaching approach which is mostly conducted based on a teacher-centered method. This approach is primarily focuses on the memorization of learning contents and does not support the collaborative activities among students, and students still utilize textbooks to study. The outcomes of this learning process provides the facts that there is needs to use new learning tools. The other approach is online learning (e-learning) which involves the use of technology to learn and access learning materials (Alblehai,2016).

(Urdan and Weggen, 2000) define e-learning as a learning model that delivers course content via electronic means such as Internet, broadcast, audio, video, and satellite. The recent e- learning tool is learning management system which is for management of the educational process via the Internet. Some universities and institutions provide different commercial learning management systems, such as Blackboard, WebCT, Jusur, and Tadarus (an Arabic-based learning management system) (Alblehai,2016).

2.3 Using LMS as an Educational Tool

2.3.1 Defining LMS

The definition of LMS for this study is an online system that allows users to share information and collaborate online (Al-Busaidi & Al-Shihi 2010, cited in Lonn and Teasley 2009). An LMS is a software application designed with the specific intent of assisting instructors in meeting their pedagogical goals of delivering learning content to students (Machado & Tao 2007). The most commonly used applications are WebCT, Moodle and Blackboard, which were developed mostly using open-source technology (Al-Busaidi and Al-Shihi 2010).

LMS have been described as a web-based service used to design, implement and assess a specific learning process. They have been in use for more than a decade but they are now considered to be the primary instructional tool in some places. A benefit of LMS is that they bridge the physical gap between the student and the instructor. The use of LMS has enabled programs like distance learning

and electronic learning (e-learning). The instructor is able to deliver instructions and learning material and to conduct student assessment through the use of LMS (Pilli, 2014).
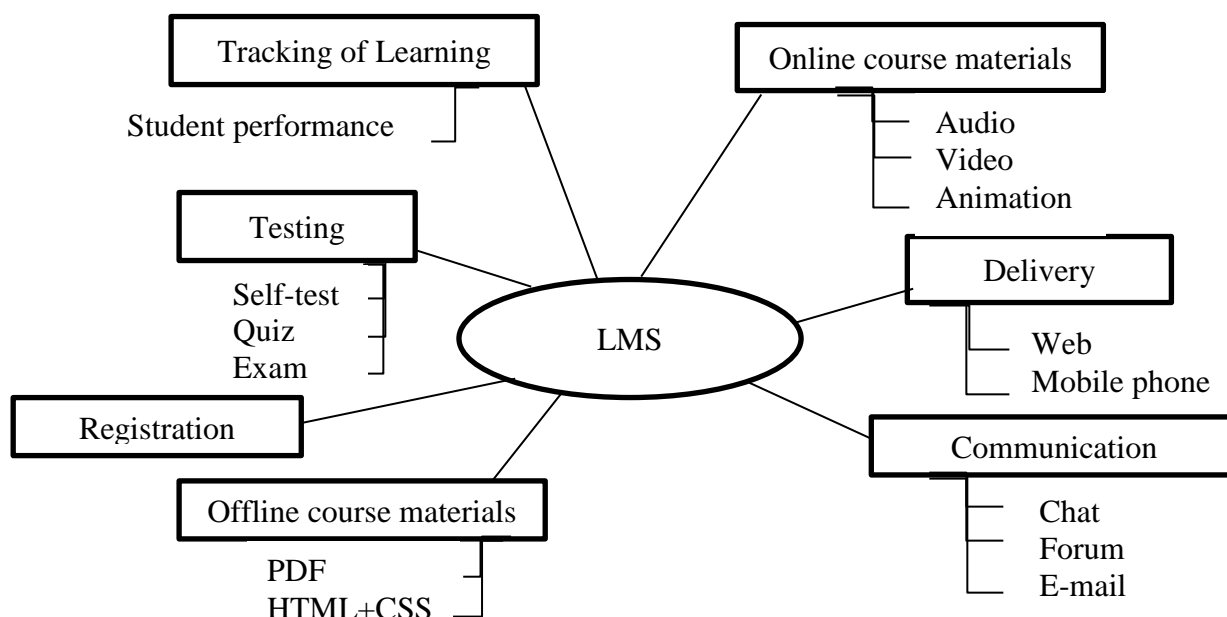
Figure 1: The structure of LMS (Hussein 2011)

2.3.2 The importance of LMS

LMS are a beneficial tool for any educational institution, specifically for instructors, as they help improve learning processes. They are scalable systems that can be used to support an entire university's teaching and learning processes, and provide tools for pedagogical functions and teaching activities that improve learning processes. For instance, asynchronous and synchronous communication (announcement areas, email and discussion forums), content delivery (learning resources and links to Internet resources), formative assessment (submission, multiple choice testing, collaborative work and feedback), and class and user management (registering, enrolling and displaying timetables) (Coates, James & Baldwin 2005) There were some studies show that LMS improves learning processes. Maloney (2013), is of the opinion that LMS is one of those important tools in e-learning.

Most public learning institutions in Saudi Arabia have adopted e-learning methods of teaching in their education systems. Zakaria et al. (2013) have demonstrated the importance of implementing LMS in the Faculty of Medicine at the University of King Saud in Saudi Arabia. According to their survey, many students used LMS while doing their assignments. The social networks provided were used mostly for general purposes. Overall, LMS were positively received since their introduction. It was the first time that the medical informatics course used LMS as a method of learning. This study showed that students benefited much more from the studies they had done before, and that the LMS tool can be recommended to any learning institution that wants to revolutionise its education system.

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2.3.3 The most-used LMS products

Hundreds of LMS products exist. Universities choose LMS depending on their needs (McIntosh 2014). An LMS is designed to be used in e-learning environments. It should have features that help achieve the objectives of the learning process. LMS must comply with the following requirements (Aydin & Tirkes 2010):

- Create content in different input format (SCORM, JavaScript, MPEG, IMS, PHP).
- Offer an exam module or online exam.
- Have multiple-language support.
- Include a calendar.
- Have backup support.
- Include a chat tool.
- Include a whiteboard.
- Allow for group work and/or debate forums.
- Be easy to install as a system.
- Include a survey.

The most-used types of LMS in Saudi universities are discussed below.

Moodle

As the creators of Moodle have stated: 'Moodle is a course management system (CMS)—a free, open-source software package designed using sound pedagogical principles, to help educators make interactive online learning communities' (Machado & Tao 2007). Moodle is one of the most widely used open-source e-learning platforms, and enables the creation of a course website, plus ensures that only enrolled students can access it (Costa, Alvelos & Teixeira 2012). Moodle has been designed to be flexible and easy to modify, and was written using the popular and powerful PHP language, which runs on any computer platform (Dougiamas & Taylor 2003). Moodle is outstanding software with many features. It aims to improve educational quality and includes all the tools necessary for e-learning. Moodle has the ability to create content in the format of SCORM and IMS. It also supports 77 different languages, and provides 10 different types of support exams that can be prepared according to time, date and duration constraints. Further, it supports chat and group work, and can be reached for maintenance and support from Moodle.org and different sites (Aydin & Tirkes 2010).

Blackboard

According to Itmas and Megies (2005), Blackboard is one of the leading commercial LMS (or CMS) software packages used by North American and European universities (Machado & Tao 2007). Blackboard is not open-source software. It provides powerful and easy-to-use systems for educational instruction, communication and assessment (Bradford et al. 2007). Blackboard provides the ability to include a calendar for each course in which a student is enrolled. Even though each

year there are new LMS, the Blackboard LMS has become the dominant e-learning software company. Blackboard provides several communications channels to allow students to communicate with each other and with teachers, including announcements, discussions, a virtual classroom and email (Bradford et al. 2007).

Machado and Tao (2007) compared two LMS—Blackboard and Moodle. The goal of their study was to compare the usability and effectiveness of two competing LMS. They surveyed users' experiences with two LMSs using the Likert scale. The results of the study were unclear, and in general no one LMS was found to be better than the other when the systems were compared on functionality. However, students surveyed preferred Moodle over Blackboard LMS. They rated the material organisation and communication functionality of Moodle higher, and found it easier to use. They stated that they would prefer to use it over Blackboard in their future university courses. However, this study does not provide enough proof that Moodle is a more effective LMS than Blackboard.

JUSUR (Saudi Developed LMS)

After much investigation, the Saudi Ministry of Higher Education—through the National Centre for E-learning and Distance Education—established JUSUR, in cooperation with international experts (Hussein 2011). JUSUR is a leaning management system based on METEOR-OUM, the Malaysian Open University's popular LMS (Al-Khalifa, 2010). JUSUR is an integrated software system responsible for managing the e-learning process, including registration, scheduling of courses, making content available to students, tracking (following-up students' performance), communication among students (through chats, discussion forums, mail and post files) and assessment that could be done through online tests or other type of assessment. Students can access their grades and assignments after logging in to their own JUSUR page (Hussein 2011).

Table 1 shows the most-used LMS products in some countries, as found by several studies (Al-Busaidi and Al-Shihi 2010; Falvo and Johnson 2007; Issa 2014; Nord 2012; Unwin 2007; Carvalho, Areal and Silva 2011).

Table 1: The most-used types of LMS in various countries

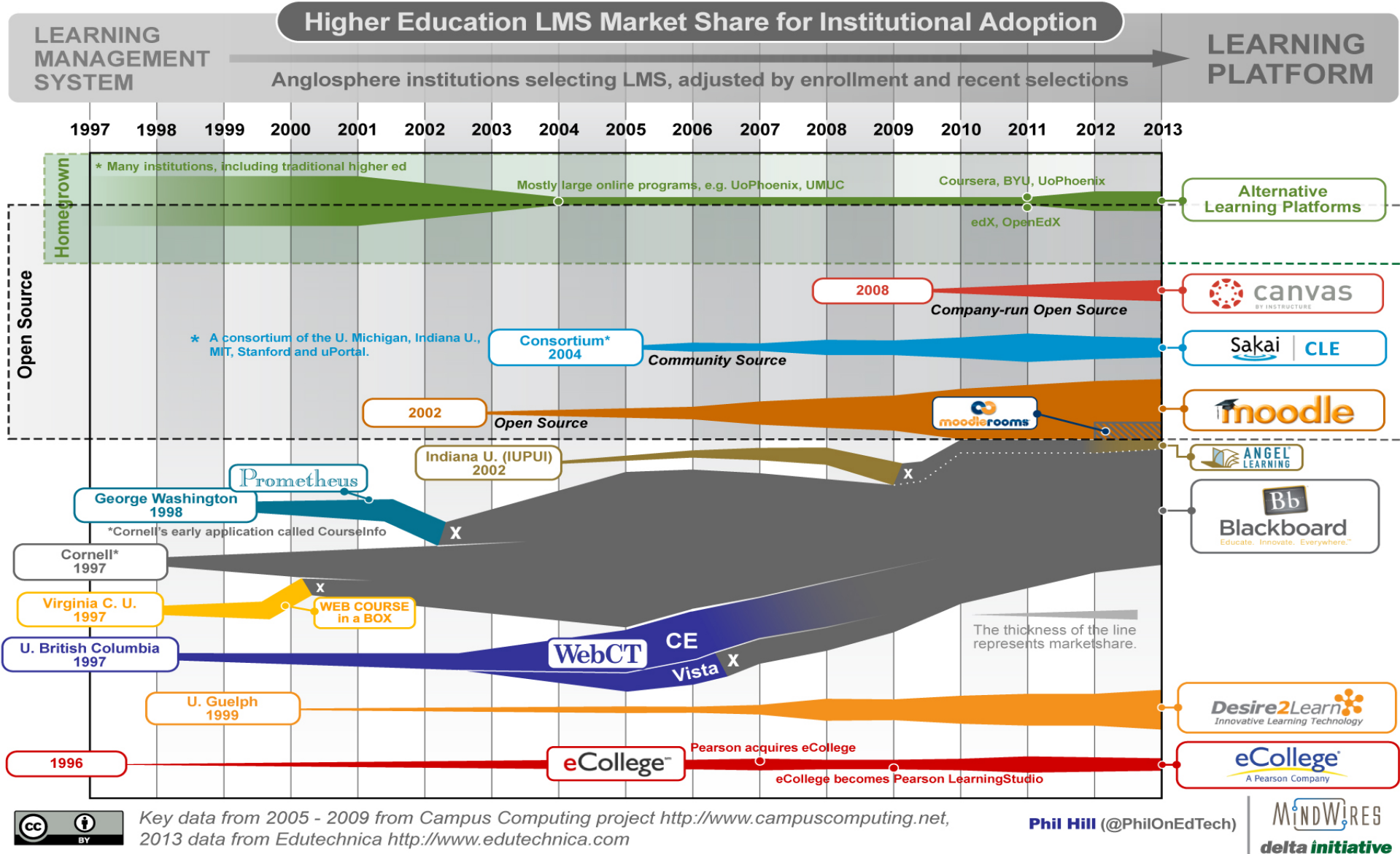| Country/LMS	Blackboard	Moodle	Edmodo	D2L	JUSUR	WebCT	ecollage	Docebo
Australia	X	X	X	X				
Brazil		X						X
Canada	X	X		X		X		
South Africa	X	X						
Qatar	X							
USA	X					X	X	
Saudi Arabia	X				X			
Portugal		X						

Figure 2: Higher education LMS market share 2013 (Dahlstrom, Brooks & Bichsel 2014)

Figure 2 shows the maturation of the LMS market, based on data from several sources, including surveys of institutions in the United States. This figure demonstrated all the products of LMS whether it is open source software or not. The figure illustrates that eCollege learning management system was the first LMS that was created in 1996. However, Blackboard was created in1997 and it was the most used LMS in the period from 2002 to 2013. In 2002, the open source LMS were available, and Moodle was the most used open source LMS (Dahlstrom, Brooks & Bichsel 2014).

2.3.4 Privacy of LMS

Despite the importance of LMS for providing learning activities, students are concerned about privacy. Most LMS ensure that all students' activities are secure and private, but there are some problems regarding faculty use and overuse of students' activities.

Lowenthal and Thomas (2009) state that online discussion forums are a great environment in which to have students post their work and receive faculty and student feedback. By simply replacing the drop box with public submission of work, any student assignment becomes a performance. The other objective is to allow students to learn from the direct assessment of not only their own work but also that of their peers. This study is a valuable study in regards of achieving pedagogical goals.

2.4 Using Social Media Sites as an Educational Tool

2.3.1 Social media

Pilli (2014) states that social networks are web-based platforms through which people can create and maintain social ties with others in their networks, or people with whom they have shared interests. Social networks and social media as a whole have become very popular. Because of their ease of use, access to relevant technology and variety of features, a large percentage of the world's population uses social networks and social media. Facebook—one of the major social networks— has over a billion active monthly users; roughly one in six people in the world.

2.4.2 Use of social media sites as LMS

Pilli (2014) outlines that the general characteristics of an LMS are that instructions are unique to each lesson, the lessons are part of a standard curriculum, the coursework expands in a consistent level according to the curriculum, the instructions are provided according to a student's progress, and the LMS is able to collect assessment of the student's progress. These characteristics are unique to an LMS, and they are a significant part of why LMS are successful. Social Networking Sites (SNS) allow people all over the world to meet and interact via the Internet. They allow multi-user interaction and multifaceted interactions between users. As a result, some characteristics of SNS allow them to be used as LMS (Pilli 2014).

LMS and SNS are available via the web, and they allow interaction between two or more people, regardless of their location. These are the most important characteristics shared by the two platforms that make it possible for SNS to be used as LMS. Using SNS sites as LMS is viable because it

enables the support of students, their teachers, the education system and external networks. SNS also allow learners to develop networking and social skills, in addition to providing an avenue for social capital building (Pilli 2014). SNS allow users to post documents, photos, audio clips and video, in addition to text. This study ensures that educational material can be shared easily among students and teachers. Also, it ensures that the students are able to enhance their collaborative skills, where each student contributes materials unique to their geographical location. As a result, teachers and instructors have started using social networks as LMS as they are able to fulfil the requirements of an LMS. This has been achieved by use of class social media pages moderated by the instructor, where learning material can be posted and instructions delivered (Pilli 2014).

Wang et al.'s (2012) study has shown that social media sites can be used to deliver learning resources. The study was conducted in Singapore, and used Facebook as an LMS in two courses. A Facebook group was used for posting announcements, sharing resources and organising weekly tutorials. This study demonstrated that Facebook groups can be used as an LMS because it has several pedagogical, social and technological benefits. The students who participated in this study were satisfied when they used a Facebook group as an LMS. However, Facebook does not support some file formats, and Facebook is not considered a safe environment (Wang et al. 2012). This study confirmed that social media in general, and Facebook in particular, can be used as an educational tool, and that some universities could use Facebook as an LMS.

2.4.3 The most-used types of social media site

Many types of social media are useful for online learning environments. SNS allow users to post documents, photos, audio clips and video, in addition to text. They are virtual spaces where students with similar interests gather to communicate, share photos and discuss ideas (Wang et al. 2012). This research concentrates on Facebook and Twitter.

Facebook

Facebook is the most popular commercial social network that has over a billion users. Some studies show that over 90% of students use Facebook as an aide to learning (Milošević et al. 2015). Facebook is one of the social media that has potential for teaching and learning because of its unique built-in functions that offer pedagogical, social and technological affordances. In recent years, Facebook has become one of the most prominent SNSs. Some of the online learning activities that Facebook can provide to students are listed below.

Posting announcements

Facebook allows teachers to post announcements that include hyperlinks, pictures and videos. It also allows participants to share resources and get feedback from others.

Sharing course resources

Course materials may exist in any format such as a text file, a PowerPoint presentation, or a PDF document. However, Facebook can only work with materials in either a picture or a video format.

Online discussions

There are two ways of conducting online discussions through Facebook: to use the feedback space under the event function, or to use the default discussion function located on the Facebook group (Wang et al. 2012).

Twitter

Twitter is a SNS that delivers information instantaneously in real time. Users can post original tweets or retweet information from people they follow, as well as send private and public messages. Twitter is used in almost all countries and it is available in 20 languages. It has over 550 million users who tweet over 58 million times per day, sending 9,100 tweets per second (Camiel et al. 2014).
Twitter can be used as an educational tool to support students' informal learning activities. Students may discover resources to help them in their coursework. Another benefit of using Twitter is to enable students to write clearly and concisely, as a tweet is limited to 140 characters (Dunlap & Lowenthal 2009). The online learning activities that Twitter provides are discussed below.

Posting announcements

Twitter allows for posting announcements that can include hyperlinks, pictures and videos. It also allows participants to tweet (post) or share resources and get feedback from others.

Sharing course resources

By providing hyperlinks, Twitter can support any format such as a text file, a PowerPoint presentation, or a PDF document, in addition to photos and clips.

Online discussions

Students can participate in discussions by researching the hashtag connected to a discussion, and write their feedback under this hashtag or under the tweet itself.

2.4.4 Privacy on social media sites

When people join SNS, they begin by creating a profile, then make connections to existing friends as well as those they meet through the site. A 'profile' is a list of identifying information, which can include the user's real name or a pseudonym. It also can include the birthday, hometown, religion, ethnicity, personal interests and photographs of the user. Users can make information either public or private, and popular activities include updating others on activities and whereabouts, sharing photos and archiving events (Dwyer, Hiltz & Passerini 2007). Many studies confirm that the privacy of students is a critical concern in social learning environments, and students must feel safe, secure

and comfortable in socially enabled environments. Some students may not want their friends to know what they are doing in a course or in their personal life (Wang et al. 2012).

Some SNS allow users to control the privacy level of their profile. Facebook is one, and users can set their profile as private or public. Lewis, Kaufman and Christakis (2008) analysed the privacy preferences of a cohort of undergraduate Facebook users. They posited two types of mechanisms by which an individual may adopt a 'private' profile, and developed four hypotheses to assess these mechanisms. The first hypothesis is that the more friends with private profiles a student has, the greater their likelihood of maintaining a private profile themself. The second hypothesis is that the more active a student is on Facebook, the greater their likelihood of maintaining a private profile. The third hypothesis is that private profiles are more common among women than men. The final hypothesis is that students with private profiles exhibit a set of cultural preferences distinct from that of students with public profiles.

2.5 Data Analysis Using Data Mining (association rules technique):

There has been research using data mining, Castro et al. (2007) states that the assessment of students is the e-learning issue that commonly evaluated using data mining methods. Also, data mining methods could be used to extract useful patterns to evaluate online course activities. This study confirmed that the data mining processes enable the extraction of data to find an appropriate solution for educational problems and data mining techniques could improve the learning tasks and solve the learning problems.

In this research data mining techniques are used to evaluate the factors and barriers that may impact on the use of LMS and social media and to find the association between different means to deliver learning resources in Saudi universities.

3. METHODOLOGY

3.1 Study Design

This research was designed as an exploratory qualitative and quantitative study that aimed to compare the use of LMS and social media in Saudi universities. The research design was framed as an exploratory quantitative study, in order to discover the percentage of students who used LMS or social media to access learning resources. Qualitative analysis was also used to discover factors that may arise using LMS or social media in Saudi universities.

The questionnaire was divided into four parts, which framed the structure of this research. The first part was to obtain basic demographic information from the students. The second and third parts were designed to evaluate the use of LMS and social media, respectively. The final part was to determine how students can access their learning resources if the university does not provide LMS or social media. The questionnaire was designed to take 15–20 minutes to complete it.

3.2 Universities Involved

The questionnaires were distributed to two Saudi universities with their permission: King Saud University (KSU) and Princess Nourah bint Abdulrahman University (PNU). These two universities were chosen because they were:

- recently established or well established;
- capital-city based;
- using the same LMS (Blackboard).

KSU is located in the capital city, Riyadh, and is the oldest established university in Saudi Arabia. It is highly respected as one of the best universities in Saudi Arabia. PNU is also located in Riyadh, and is a newly established university. It is also highly respected and regarded as one of the best universities in Saudi Arabia.

3.3 Participants

This study included 452 students from the two selected universities in Saudi Arabia; 124 males and 309 females. Participants' names were not collected, to preserve anonymity. The number of responses was far greater than the expected 200. The students came from different years of study, and half (51.4%) had average computer skills. All but three of the students had computer or mobile devices, and almost all had access to the Internet at university.

3.4 Survey Instrument

The questionnaire (see Appendix A) was divided into four parts. The first part included questions relating to the demographic information of the students, such as age, gender, year of study and level of computer skills. In question 7 (the final question in this section), students were asked to choose which method their university used to deliver learning resources. If their answer for this question was LMS (a), they moved to the second part, whereas if their answer was social media (b), they moved to the third part. If they chose email or other (c, d), they moved to the last part of the questionnaire. The second part of the questionnaire was designed to verify the level of current use of LMS, and the type of LMS used in Saudi universities. The first question in this section was to define the type of LMS that the universities used to deliver learning activities. Question 9 was designed to give a general evaluation of the use of LMS, whereas questions 10 to 13 were to determine the actual use of LMS for learning activities, such as submitting assignments, announcements, communication between teachers and students, or between students and each other. This was important for verifying the knowledge of the use of LMS features in Saudi universities. The last section in this part (questions 14 to 20) were to gauge the students' level of satisfaction with this technology. These questions followed a traditional five-point Likert scale from 'strongly agree' to 'strongly disagree', according to how they felt about using LMS.

The questions in the third part of the questionnaire had the same structures and purpose of the previous part, but this section designed for the use of social media in universities was evaluated. The results from this section will help to verify the knowledge of the use of social media sites features in Saudi universities. The goal of the last part was to determine how students undertake learning activities if universities do not provide LMS or SNS.

This survey was a pilot survey, and this research has some limitations to the generalisation of the results as mentioned in the first chapter. The sample size is relatively small and comes from only two Saudi universities. The responses regarding the barriers and factors for the use of LMS and SNS are from a student perspective only and not all possible barriers and factors have been investigated. The validity of the survey instrument requires follow-up research.

3.5 Ethics Approval

The participants were asked to participate voluntarily. There were no consequences for taking part or not, and there was no exploitation of the participants. The survey was completed anonymously, out of respect for the privacy of participants and their institutions. No culturally sensitive issues were being investigated. Ethics approval was given by Flinders University's Social and Behavioural Research Ethics Committee (project number 7088) (see Appendix B).

3.6 Data Collection

After receiving ethics approval, an email was sent to the involved universities to ask for permission to collect the data. The request email included the information sheet, a letter of introduction from the research supervisor, and a letter from a Saudi mission (see Appendix C).

PNU granted approval after receiving the email, but KSU asked to visit in person to receive approval. The data were administered using an online survey designed using Google Docs, after the questionnaire had been translated into Arabic. Participants accessed the survey through Google Drive.

Figure 3: Screen shot of the translated survey on Google Drive

Figure 4: Screen shot of the collected data in Excel file
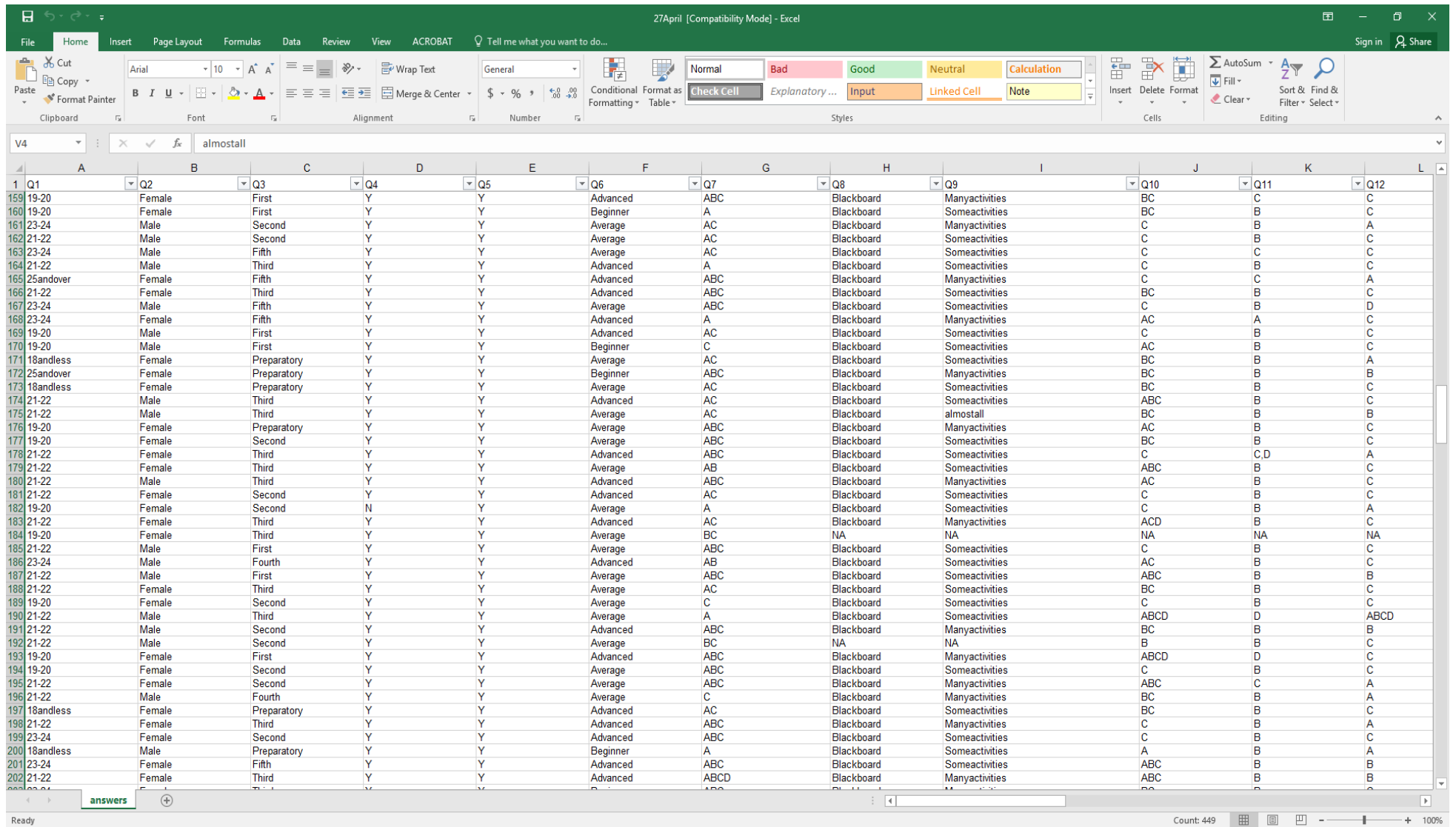
Figure 5: Screen shot of the translated data

It took three months to collect the data. It was exported as an Excel file and translated from Arabic to English (see Figures 4 and 5). A copy of the Excel file was converted to an arff file by Excel to arff converter software (https://sourceforge.net/projects/exceltoarffconv/) (see Figure 6). After converting the data file to an arff file, the file was saved to desktop.
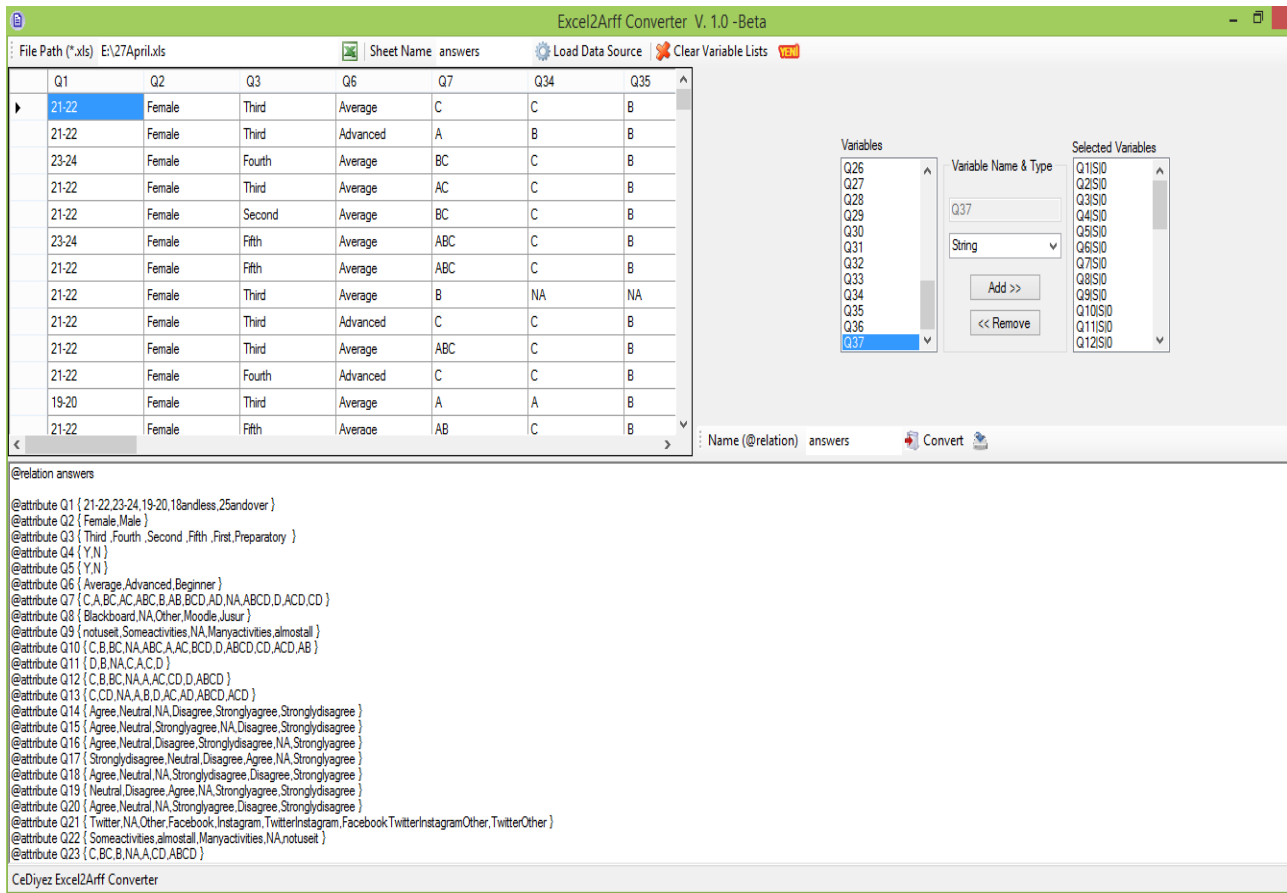
Figure 6: Screen shot of the data after conversion to arff file

3.7 Data Analysis

The data was analysed using Excel and WEKA software. This research used Excel software for quantitative analysis, and WEKA software for qualitative analysis.

Excel

The copy of Excel file used to provide the demographic information of the participants. Also, Excel software provide the statistical analysis of the current use of LMS and social media in Saudi universities. Furthermore, this study used Excel to analysis the Likert data of the survey questions which discussed the factors and barriers that may impact the use of LMS and social media in Saudi universities. The next chapters discussed the results of statistical analysis of the research data using pie chat and bar chart.

WEKA

The WEKA software stands for Waikato Environment for Knowledge. It is a data mining system developed to execute data mining algorithms (Holmes, Donkin & Witten 1994), and a contemporary platform for generating machine learning techniques alongside their applications to problems of real-world data mining (Aksenova 2004). Created in New Zealand by the University of Waikato, WEKA executes algorithms for data classification, clustering, regression, processing, association rules and visualisation tools. The open-source software is released under the GNU's General Public License (Hall et al. 2009).

'Association rules' was the technique used in this study to find any association between LMS and social media regarding the delivery of learning resources. Association rules were introduced in 1993, and is a method used to discover interesting relationships among variables within a database. The relations are not anchored on the inherent characteristics of the data themselves, but rather are derived from the co-occurrence of data items (Borgelt & Kruse 2002).

Apriori Algorithm refers to an algorithm for mining a frequent item set, as well as association rules over transactional databases. Proposed in 1994 by Agarwal and Srikant, this algorithm was designed to be executed on databases containing transactions. The apriori algorithm uses a 'bottom up' methodology, where regular subsets are extended one entry at a time, with groups of candidates being tested against the data set (Borgelt & Kruse 2002). The algorithm stops when no more successful extensions are found, efficient algorithms are required to restrict the search area and only a subset of all rules are analysed, without omitting key rules. During the initial step of the apriori algorithm, the Itemset tree is developed level by level. Different data structures may be used for its nodes. Primarily, simple integer vector numbers are used to represent the counters (Borgelt & Kruse 2002). In this study, apriori algorithm was used to generate association rules between using LMS and social media for learning activities.

This study is to compare and find the relationship between the use of LMS and Social media. For the Likert data, the association rules used to relate the group of students who agree or disagree about the tested factors that impact the use of these technology and their methods of how they access their learning resources.

3.8 Project Plan

The figure below shows the projected timeline that was devised at the beginning of this project.
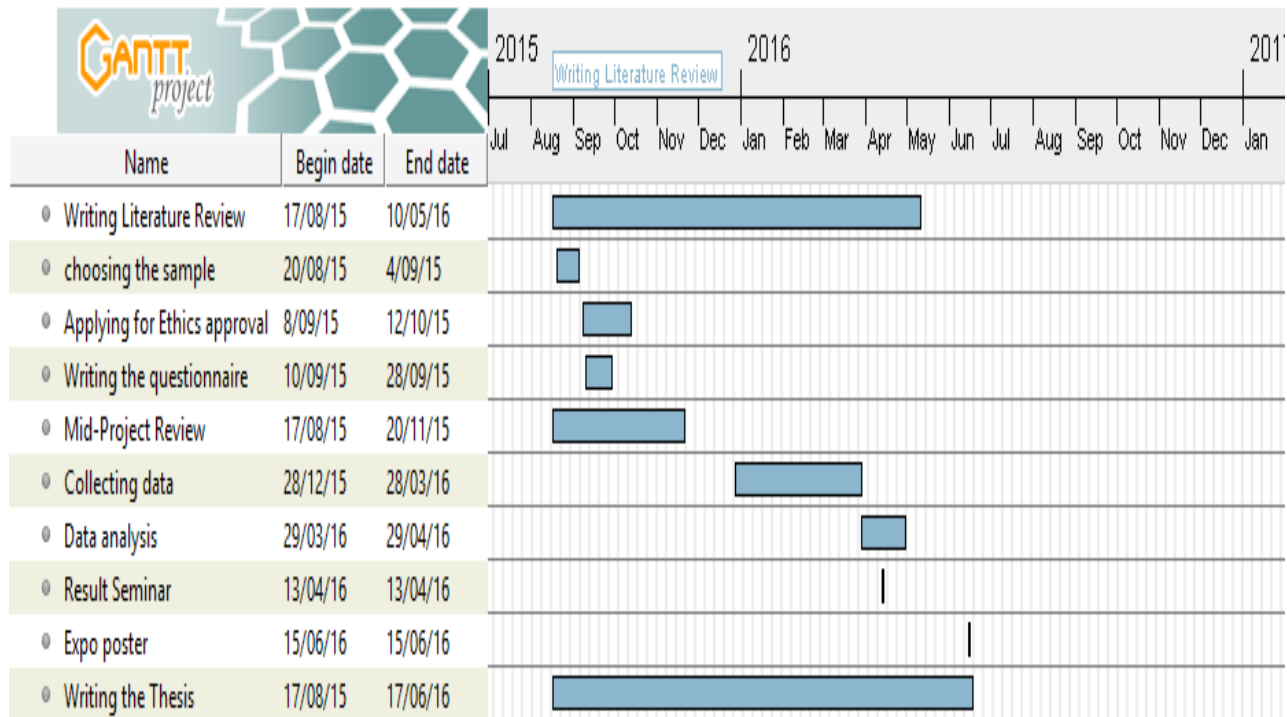
Figure 7: The Gantt chart of the project

4. RESULTS

This chapter provides the key results that were received from the collected data. The first section of the chapter shows the demographic information of research participants, such as age, gender and year of study. The second and third sections show the results of evaluating the use of LMS and social media for learning activities, respectively. The fourth section discusses the results of attempts to gauge students' levels of satisfaction with using LMS or social media to deliver learning resources.

4.1 Demographic Information
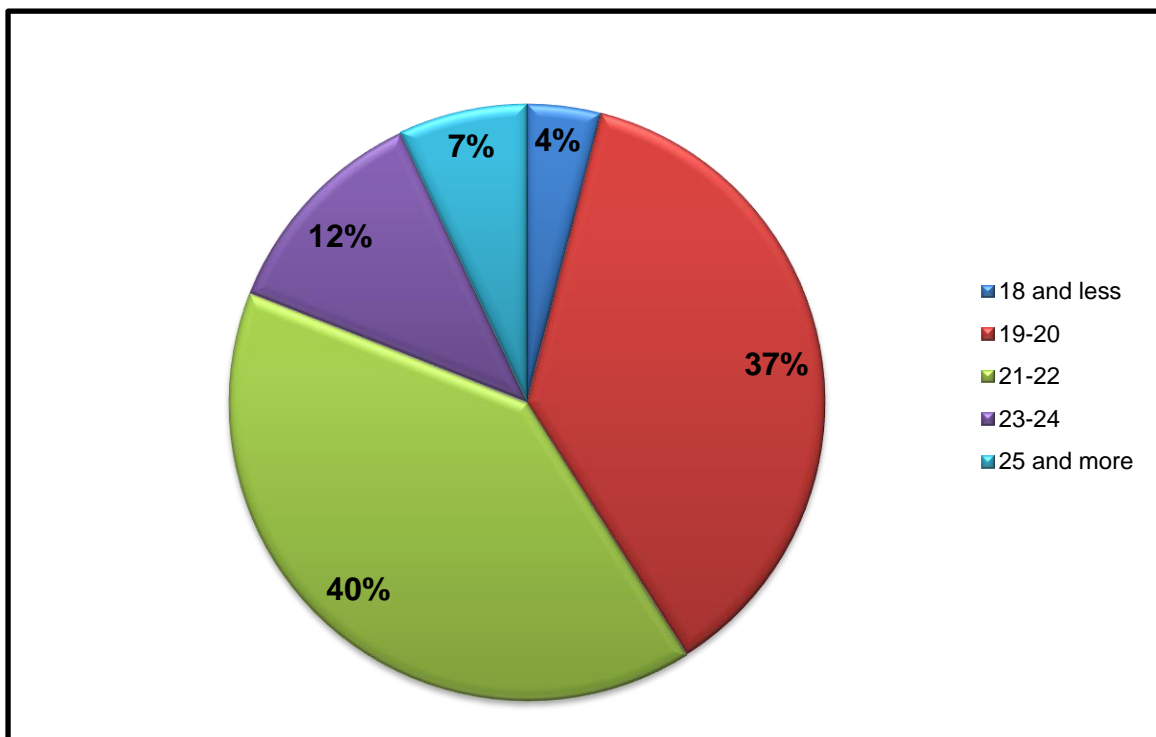
Figure 8: Students' age composition

The majority of respondents (77%) were aged age between 19 and 20 (37%) and 21 and 22 (40%).
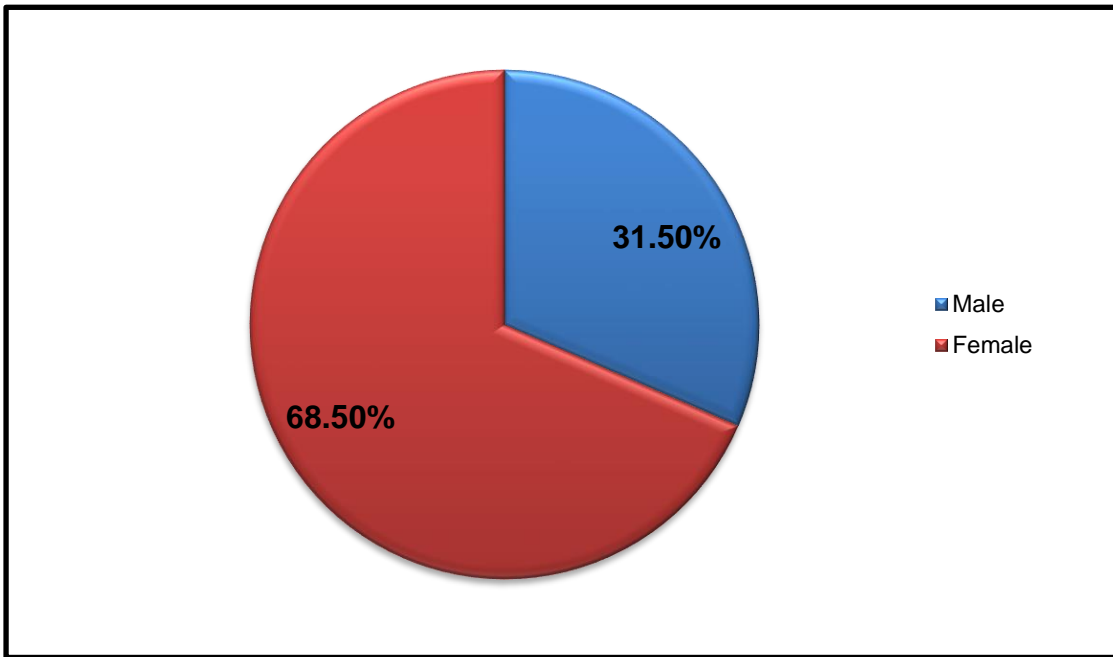
Figure 9: Gender composition of students

Figure 9 above demonstrates that the majority of respondents were female (68.5%), and the number of male respondents was (31.5%).
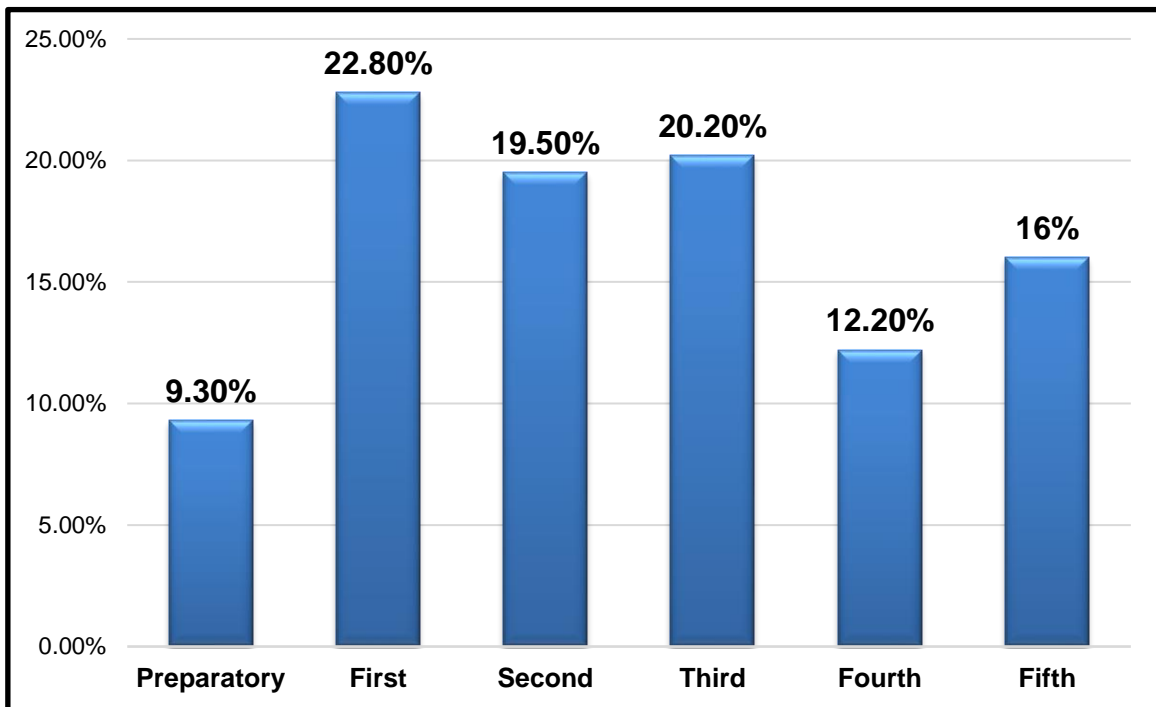
Figure 10: Distribution of students according to their year of study

Figure 10 illustrates that the highest number of respondents were students in their first and third years of study, respectively (22.3%, 20.2%). The least number of participants were in their preparatory year (9.3%).
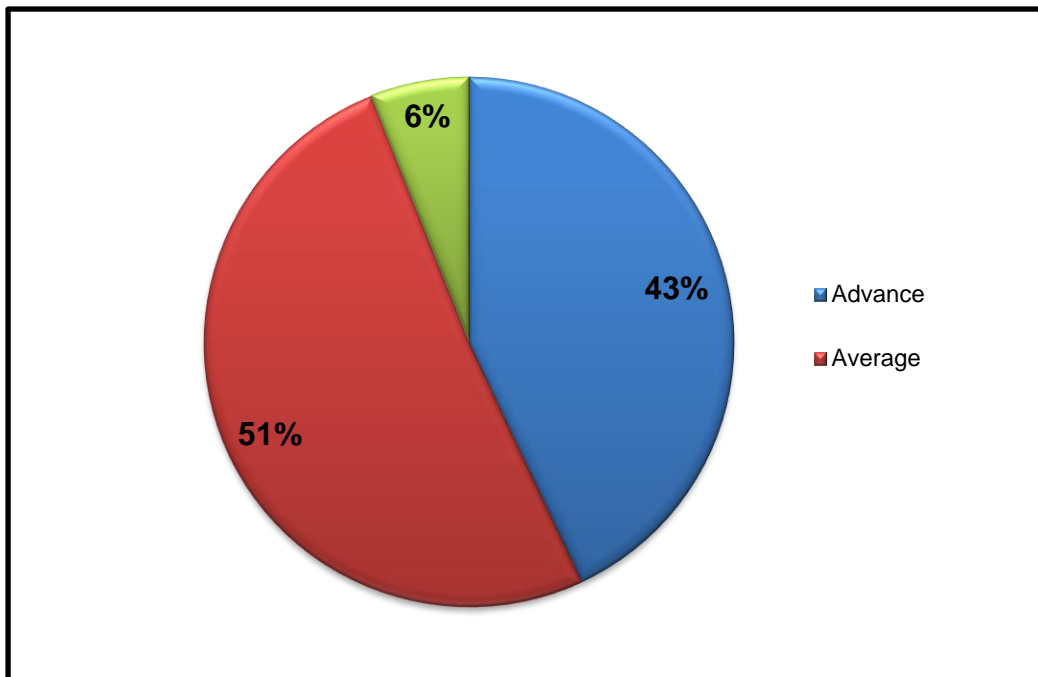
Figure 11: Students' level of computer skills

Figure 11 shows that more than half of the participants had an average level of computer skills (51%), whereas only 6% were beginners.

4.2 The Current Use of LMS
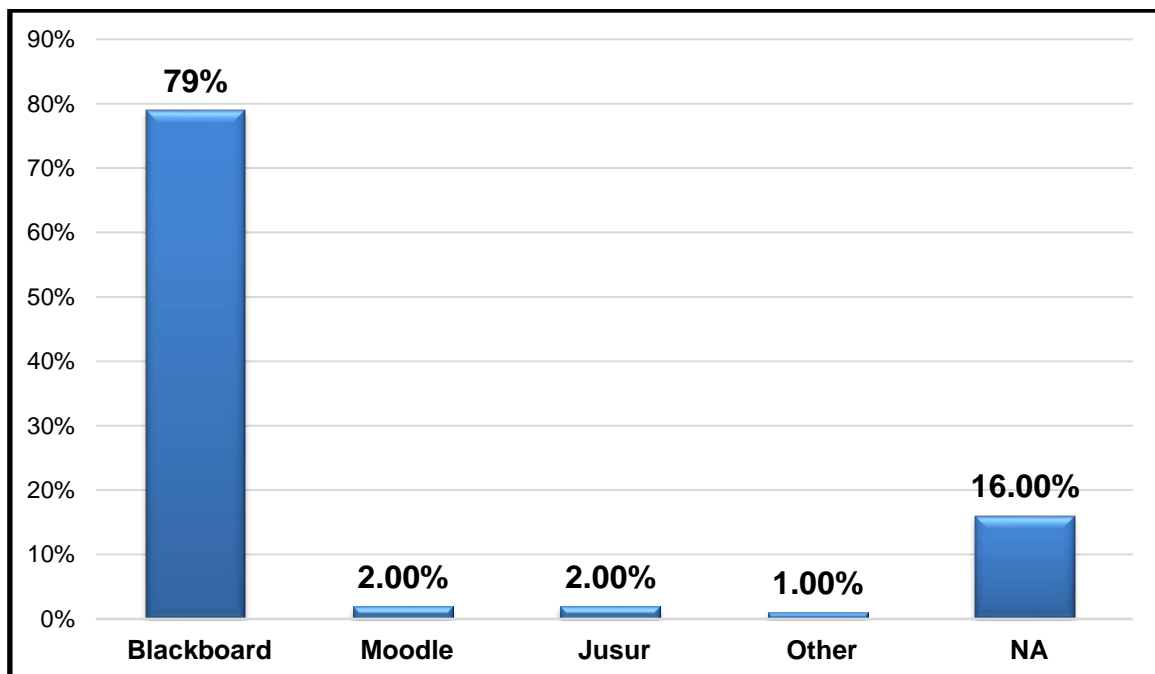
Figure 12: Use of LMS products in Saudi universities

Figure 12 illustrates that 79% of students (from both universities) use Blackboard. Only 2% of students used Moodle and JUSUR. This suggests that either one university or both may provide

more than one LMS. Some students (only 1%) mentioned other LMS for instance: edmodo. 16% of the students did not answer this question.
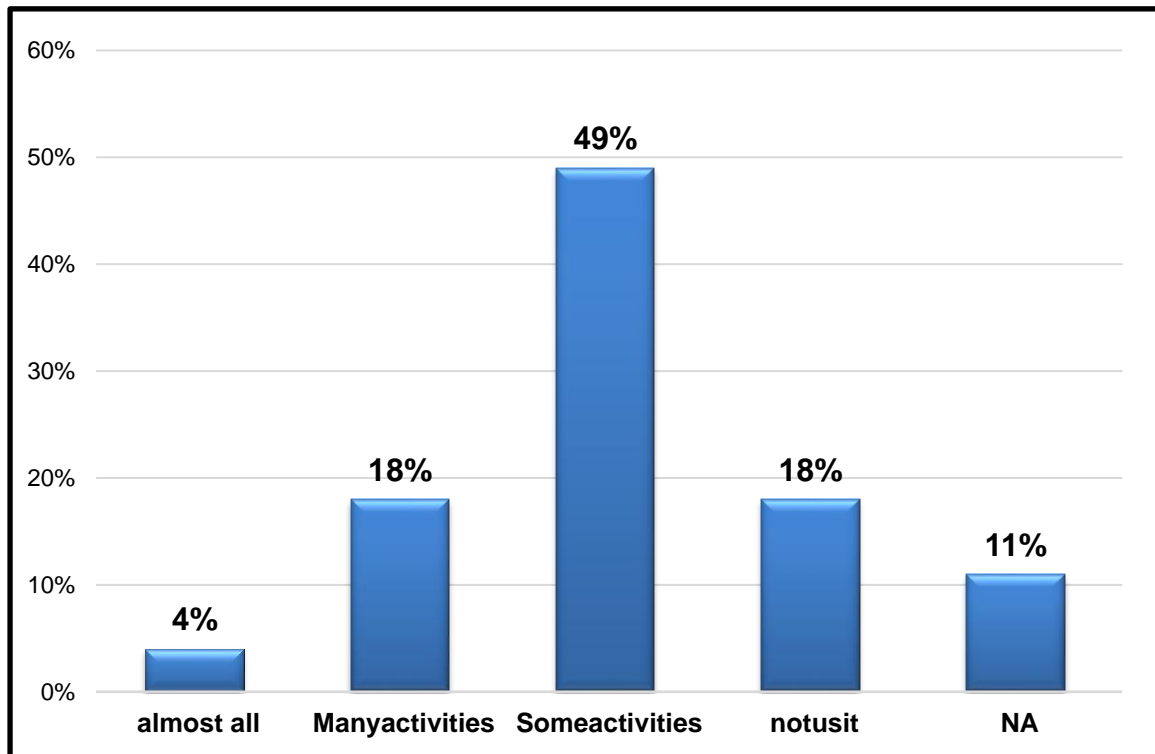
Figure 13: Students' evaluation of LMS use for learning activities

The majority of students used LMS for some of their learning activities (49%). Only 4% of students used LMS for almost all learning activities, and (18%) of students do not use LMS. 11% of the students did not provide their evaluation of LMS use for learning activities.

4.3 Current Use of Social Media
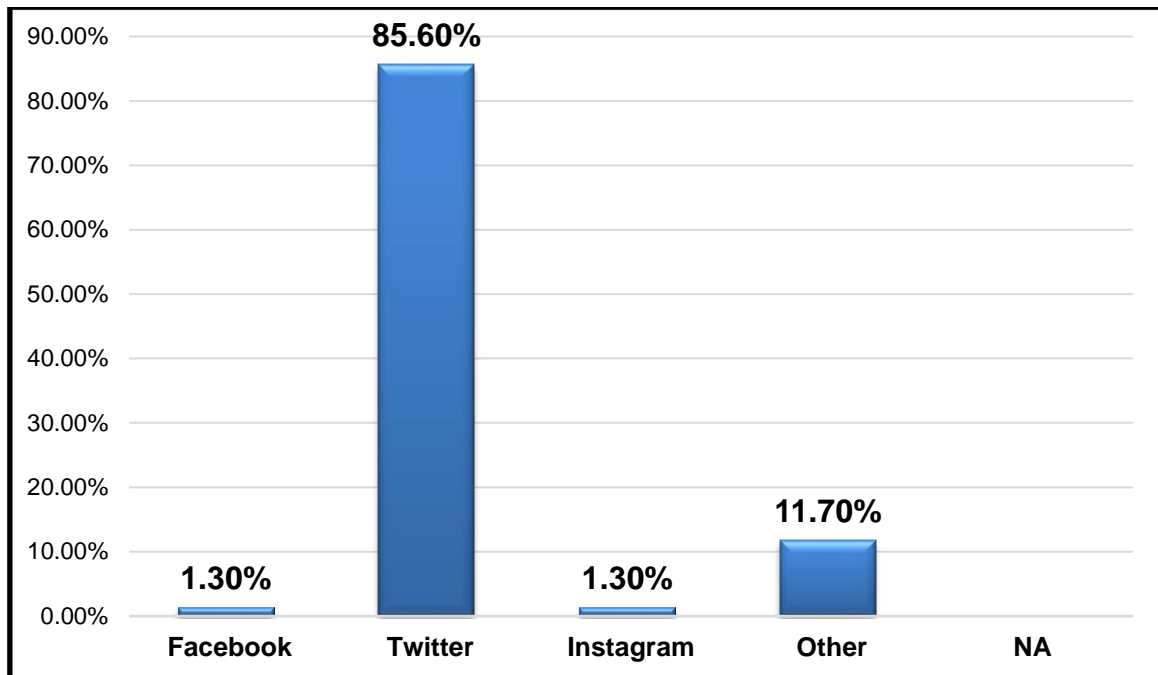
Figure 14: Use of social media products in Saudi universities

Figure 14 shows the types of social media used to deliver learning resources in Saudi universities. The most-used type was Twitter (85.6%). Facebook and Instagram were the least used type (1.3%). 11.70% of the students used different social media such as Watsapp and Telegram.
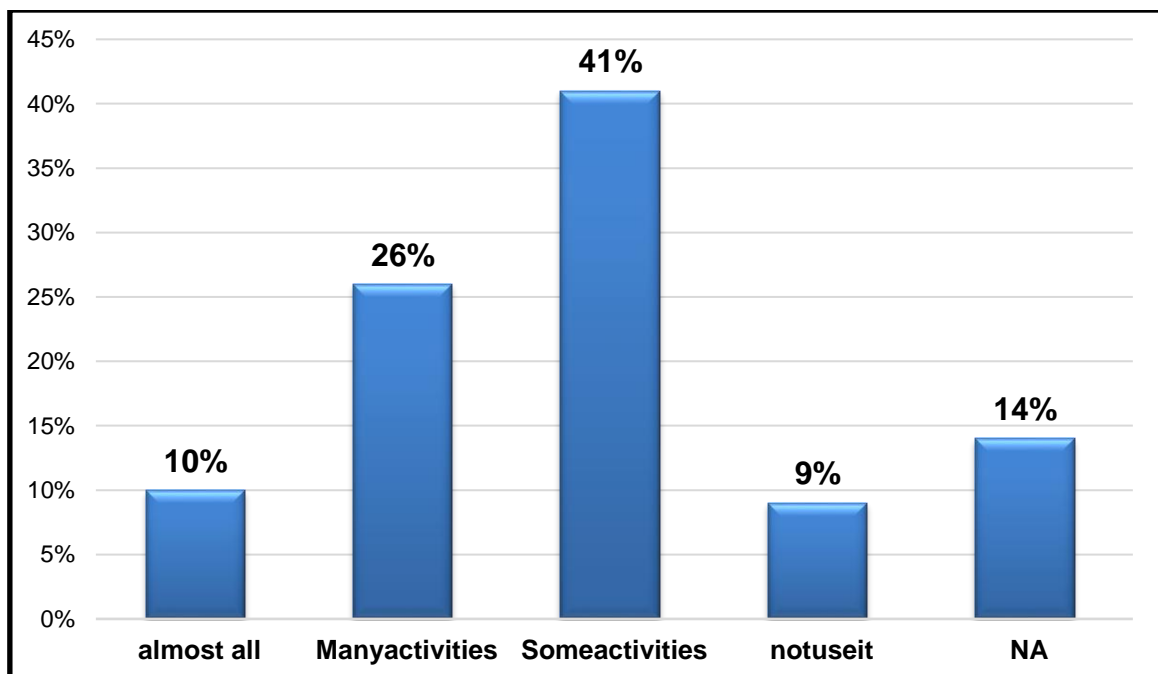
Figure 15: Students' evaluation of the use of social media sites for learning activities

The majority of students used social media sites for some of their learning activities (41%), whereas 9% of participants do not use social media for learning activities at all.

4.4 Association Rules for Using LMS and Social Media

This research has found 100000 association rules for using LMS and Social media in Saudi universities. The most interesting rules, which is important to answer research questions, are listed below. All the rules are saved on DVD that attached with this thesis and it is uploaded on Google Drive, the link is below:

(https://drive.google.com/file/d/0B-Voi20grBU1ZWI4V2RNZWtpVFk/view?usp=sharing)

```
=== Run information ===
Scheme:      weka.associations.Apriori -N 100000 -T 0 -C 0.1 -D 0.05 -U 1.0 -M 0.1 -S -1.0 -c -1
Relation:    answers
Instances:   452
Attributes:  35
=== Associator model (full training set) ===
Apriori
=======
Minimum support: 0.15 (68 instances)
Minimum metric <confidence>: 0.1
Number of cycles performed: 17
Generated sets of large itemsets:
Size of set of large itemsets L(1): 90
Size of set of large itemsets L(2): 709
Size of set of large itemsets L(3): 1908
Size of set of large itemsets L(4): 2746
Size of set of large itemsets L(5): 2339
Size of set of large itemsets L(6): 1141
Size of set of large itemsets L(7): 305
Size of set of large itemsets L(8): 56
Size of set of large itemsets L(9): 11
Size of set of large itemsets L(10): 1
```

Run Information gives the following information (Aksenova 2004; Tan et al. 2005):

- The used algorithm: Apriori
- The relation name: answers
- Number of instances in the relation: 452 (number of participants in this study)
- Number of attributes in the relation: 35 (the number of the selected survey questions to find the relationships between them
- Minimum support: support determines how often a rule is applicable to a given data set.
- Confidence: determines how frequently an item appear in transactions
  The algorithm stops when either the specified number of rules is generated, or the lower bound for minimum support is reached.

The results for Apriori algorithm are the following:

First, the program generated the sets of large itemsets found for each support size considered. In this case seven item sets of ten items were found to have the required minimum support. Apriori tried to generate 100000 rules. The minimum confidence is set 0.1 (10%). Generation of the required number of rules involved a total of 17 iterations (Aksenova 2004).

The interesting association rules:

12860. Q12=Email Q14=Neutral Q34=Email 80 ==> Q8=Blackboard 76   conf:(0.95)

Eighty students used email to receive announcements and to communicate with their teachers, and were neutral about LMS' ability to enable them to communicate more quickly. Their universities provide Blackboard to deliver learning resources, with a confidence level of 0.95.

12922. Q23=Email Q27=Stronglyagree Q28=Stronglyagree 79 ==> Q24=Socialamedia 75   conf:(0.95)

Students who used email to communicate with their teachers strongly agreed that social media enables them to communicate, and they enjoyed using them. At a confidence level of 0.95, they use social media to communicate with each other about their study.

15641. Q8=Blackboard Q12=Email Q21=Twitter Q24=Socialamedia Q25=Email Q34=Email 90 ==> Q36=Email 85   conf:(0.94)

In universities that provide the Blackboard learning management system and social media to deliver learning resources, their students use email to receive announcements and to communicate with their teacher; 85 of these students use email to post announcements, with a confidence level of 0.94.

10400. Q9=Someactivities Q12=Email Q35=Socialamedia 98 ==> Q34=Email 95   conf:(0.97)

Students who use LMS to do some learning activities use social media to communicate with each other about their study, and email to receive announcements. Ninety-five of these students use email to communicate with teachers, with a confidence level of 0.97.

16416. Q9=Someactivities Q11=SocialmediaQ22=Someactivities 81 ==> Q24=Socialmedia76 conf:(0.94)

Eighty-one students use LMS and social media for some learning activities. Of these, 76 use social media to communicate with each other, with a confidence level of 0.94.

16756. Q13=LMS Q23=Email 80 ==> Q8=Blackboard 75   conf:(0.94)

At a confidence level of 0.94, the universities that provide Blackboard to deliver learning activities, 80 students use LMS to submit their assignments and use email to communicate with their teachers.

17333. Q22=Someactivities Q25=Email Q35=Socialmedia76 ==> Q23=Email 71   conf:(0.93)

Students who use social media for some learning activities use it to communicate with each other too. Their teachers use email to post announcements. Seventy-one of these students use email to communicate with teachers, with a confidence level of (0.93).

20059. Q9=Someactivities Q15=Neutral 89 ==> Q8=Blackboard 82   conf:(0.92)

At a confidence level of 0.92, the universities that provide Blackboard learning management system, 89 of their students use LMS for some learning activities and had no opinion on whether they enjoyed using LMS.

55666. Q8=Blackboard Q9=Someactivities 207 ==> Q11=Socialamedia 163   conf:(0.79)

Two hundred and seven students use Blackboard for some learning activities; 163 of these use social media to communicate with each other, with a confidence level of 0.79.

16070. Q10=Email Q35=Socialamedia 103 ==> Q11=Socialamedia 97   conf:(0.94)

At a confidence level of 0.94, 97 students use social media to communicate with each other. All 103 use email to communicate with their teachers.

20578. Q21=Twitter Q28=Stronglyagree Q34=Email 74 ==> Q30=Stronglyagree 68   conf:(0.92)

At universities that use Twitter to deliver learning resources, their students strongly agreed that they enjoyed using social media, and use email to communicate with their teachers. Sixty-eight of these students strongly agreed they had the necessary knowledge to use social media, at 0.92 confidence.

24174. Q11=Socialmedia Q16=Disagree 90 ==> Q8=Blackboard 81   conf:(0.9)

At a confidence level of 0.9, the universities that provide Blackboard, 90 students of their students disagreed that their teacher encouraged them to use LMS to communicate with them. The same number of students use social media to communicate with each other about their study.

31872. Q21=Twitter Q29=Agree 117 ==> Q24=Socialmedia 102   conf:(0.87)

Of the universities that use Twitter to provide learning materials, 117 of their students agreed that their teachers encouraged them to use social media to communicate with them; 102 of these students used social media to communicate with each other about their study, at a confidence level of 0.87.

36210. Q8=Blackboard Q13=Email Q25=Email 83 ==> Q12=Email Q26=Email 71   conf:(0.86)

Of the universities that provide the Blackboard learning management system, 83 of their students use email to submit assignments and to receive announcements, with a confidence of level of 0.86.

36211. Q12=Email Q23=Email Q26=Email Q37=Email 83 ==> Q8=Blackboard 71   conf:(0.86)

At a confidence level of 0.86, of the universities that provide Blackboard to deliver learning materials, 83 of their students use email to submit assignments and receive announcements.

32076. Q17=Agree Q36=Email 101 ==> Q11=Socialmedia 88   conf:(0.87)

One hundred and one students who agreed that they have the necessary knowledge to use LMS use email to receive announcements. They use social media to communicate with each other, at a confidence level of 0.87.

32101. Q30=Stronglyagree Q34=Email Q35=Socialmedia 124 ==> Q21=Twitter 108   conf:(0.87)

At a confidence level of 0.87, of the universities that use Twitter to deliver learning resources, 124 students of theirs strongly agreed that they have the necessary knowledge to use social media. They use social media to communicate with each other regarding their study, whereas they use email to communicate with their teachers.

60143. Q16=Neutral Q34=Email 92 ==> Q23=Email 71   conf:(0.77)

Of 92 students who were neutral about teachers' encouragements to use LMS, 71 of these used email to communicate with their teacher about their study, at a confidence level of 0.77.

69916. Q16=Agree 111 ==> Q24=Socialamedia 82   conf:(0.74)

One hundred and eleven students agreed that their teachers encouraged them to use LMS. At a confidence level of 0.74, 82 of these students use social media to communicate with each other about their study.

33853. Q18=Disagree Q35=Socialmedia 102 ==> Q34=Email 88   conf:(0.86)

One hundred and two students disagreed that they felt apprehensive about using LMS or social media to communicate with each other. At 0.86 confidence, 102 of these students use email to communicate with their teachers.

34838. Q12=Email Q19=Disagree 92 ==> Q11=Socialmedia 79   conf:(0.86)

At a confidence level of 0.86, 79 students (out of 92) use social media to communicate with each other. All students used email to receive announcements, and they disagreed that they were scared that the LMS would make their personal information public.

31892. Q21=Twitter Q32=Disagree Q35=Socialmedia 78 ==> Q34=Email 68   conf:(0.87)

Seventy-eight students whose universities provide Twitter to deliver learning resources use social media to communicate with each other, and they disagreed that they were scared that social media would make their personal information public. At 0.87 confidence, there were 68 students.

58453. Q20=Disagree Q24=Socialmedia 90 ==> Q23=Email 70   conf:(0.78)

Ninety students who use social media to communicate with each other disagreed that they hesitated to use LMS because they would make mistakes that they could not correct. Seventy of these students, at confidence level of 078, use email to communicate with their teachers.

98137. Q24=Socialmedia Q31=Disagree 134 ==> Q33=Disagree 87   conf:(0.65)

One hundred and thirty-four students disagreed that the felt apprehensive about using social media to communicate with each other; 87 of these disagreed that they hesitate to use social media due to making mistakes that they could not correct, at confidence level of 0.65.

10202. Q9=Someactivities Q13=LMS 71 ==> Q8=Blackboard 69   conf:(0.97)

Seventy-one students who use LMS for some learning activities use it to submit assignments. At a 0.97 confidence level, 69 of these students were from universities that provide Blackboard as an LMS.

57889. Q31=Disagree Q33=Disagree 100 ==> Q11=Socialamedia 78   conf:(0.78)

At a confidence level of 0.78, 78 students who use social media to communicate with each other disagreed that they felt apprehensive about using social media. In addition, they disagreed that they hesitated to use it because they were afraid of making mistakes that they could not correct.

34767. Q11=Socialamedia Q19=Disagree Q23=Email 85 ==> Q34=Email 73   conf:(0.86)

Eighty-five students disagreed that LMS makes their personal information public use social media to communicate with each other about their study. Seventy-three of these students use email to communicate with their teachers, at a confidence level of 0.86.

34909. Q13=Email Q24=Socialamedia Q26=Email Q35=Socialamedia 99 ==> Q23=Email 85   conf:(0.86)

Ninety-nine students who use email to submit assignments use social media to communicate with each other. Eighty-five of these students also use email to communicate with their teachers about their study, at a confidence level of 0.86.

36559. Q20=Agree 82 ==> Q8=Blackboard 70   conf:(0.85)

Eighty-two students agreed that they hesitated to use LMS because they were afraid of making mistakes that they could not correct. Seventy of these students were at universities that used the Blackboard LMS, at a confidence level of 0.85.

52855. Q18=Disagree Q36=Email 89 ==> Q11=Socialamedia 71   conf:(0.8)

At a confidence level of 0.8, 71 students used social media to communicate with each other. These students used email to receive announcements, and they disagreed that they felt apprehensive about using LMS.

53166. Q11=Socialamedia Q17=Agree Q23=Email 103 ==> Q24=Socialamedia Q34=Email 82   conf:(0.8)

One hundred and three students agreed that they have the necessary knowledge to use LMS; 82 of these students use social media to communicate with each other, and email to communicate with their teachers about their study, at a confidence level of 0.8.

5. DISCUSSION OF RESULTS

This chapter discusses the results of the study comparing the use of LMS and social media sites to deliver learning resources. This chapter discusses the three main research questions. The first section demonstrates the problems and barriers that students may face when using LMS and/or social media to find learning resources. The second section shows the more beneficial way for Saudi students to access study and learning resources. The third and final section discusses the factors that affect the use of social media in Saudi universities.

5.1 Barriers to LMS and Social Media Use

The main barrier tested in this study is whether students have the necessary knowledge for using LMS and social media for learning activities. Figure 16 shows that the majority of participants agreed that they have the necessary knowledge to use LMS (45.8%). Figure 17 demonstrates that more than half of the students strongly agreed that they have the knowledge to use social media (51.5%). Further, the association rules between the students who agreed that they have knowledge about using LMS and their learning activities found the number of students who use email to submit their assignments to be more than those who use LMS and social media to do so (Num of rules: 32076). Regarding communication between students about their study, the number of students who use social media for this purpose was more than those who use LMS. Students who know how to use social media only use it to communicate with each other, not for other learning activities. This association rule clearfied that students who agreed that they have knowledge about using LMS and social media and their leaning activities found the number of students who use email to communicate with their teachers and receive the announcements was more than those who use LMS and social media for these activities (Num of rules: 32101). However, the majority of students know how to use LMS, only 131 students use it to submit assignments (Num of rules: 73949). According to the results, students' knowledge of using LMS or social media was not the barrier preventing them from using LMS or social media to do all learning activities.

Q17. I have the knowledge/skills necessary to use LMS

- Strongly agree — 17.60%
- Agree — 45.80%
- Netural — 20.50%
- Disagree — 12.60%
- Strongly disagree — 3.50%

0.00% 5.00% 10.00% 15.00% 20.00% 25.00% 30.00% 35.00% 40.00% 45.00% 50.00%

Figure 16: Students' knowledge of how to use LMS

Q30. I have the knowledge/skills necessary to use social media

- Strongly agree — 51.50%
- Agree — 35.60%
- Netural — 9.60%
- Disagree — 2.50%
- Strongly disagree — 0.80%

0.00% 10.00% 20.00% 30.00% 40.00% 50.00% 60.00%
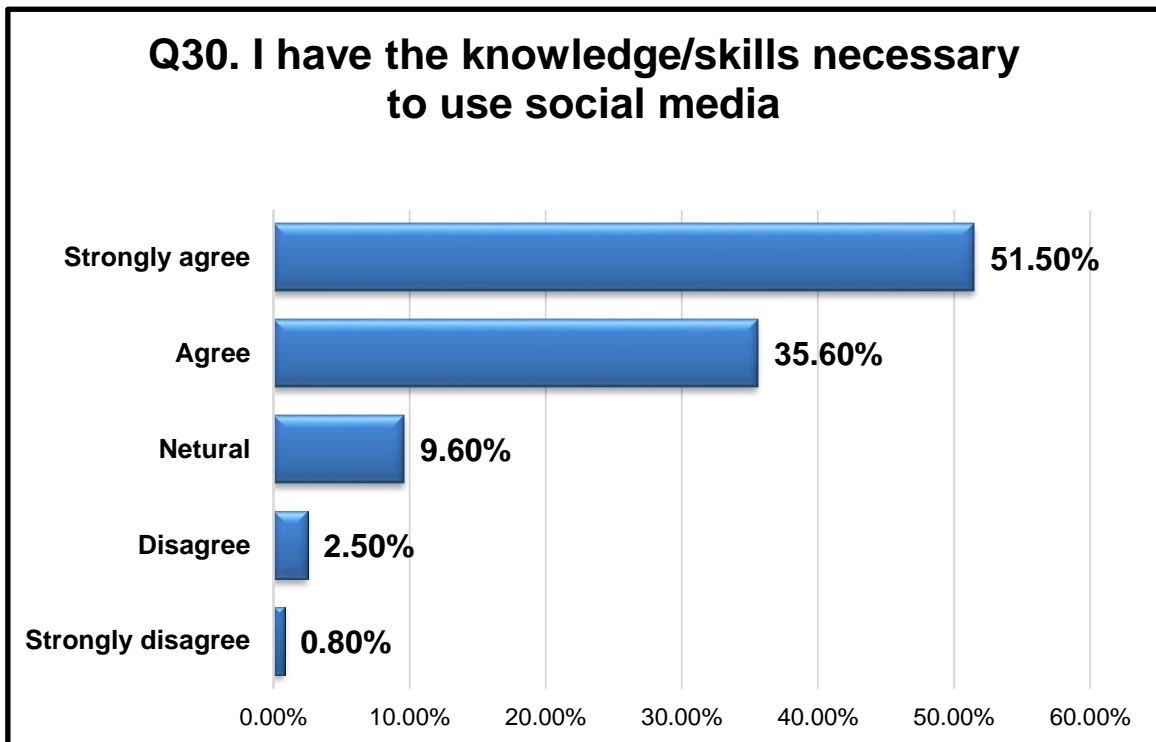
Figure 17: Students' knowledge of how to use social media

5.2 The Beneficial Medium for Delivering Learning Resources

5.2.1 Students' communication using LMS and social media

This study cannot suggest one medium that is most beneficial for delivering learning materials and undertaking study activities. However, the results show the preferred way for students to undertake certain activities. Regarding students' communication with each other and their teachers using LMS, Figure 18 illustrates that it is unclear whether using LMS enables students to communicate more quickly (37%), whereas 41.6% of students agreed that LMS enable them to communicate more quickly. From the association rules, 82 students who were confident using LMS to enable them to communicate with students and teachers more quickly also use email to communicate with their teachers about their study (Num of rules: 26695). Further, 80 students who agreed that the use of LMS allows them to communicate more quickly, also use social media to communicate with each other about their study (Num of rules: 33895). Conversely, Figure 19 shows that using social media for the same purpose was preferred over using LMS, and 40.4% of students strongly agreed that using social media enables them to communicate with students and teachers more quickly. Of these students, 75 use social media to communicate with each other and use email to communicate with their teachers about their study (Num of rules:12922).
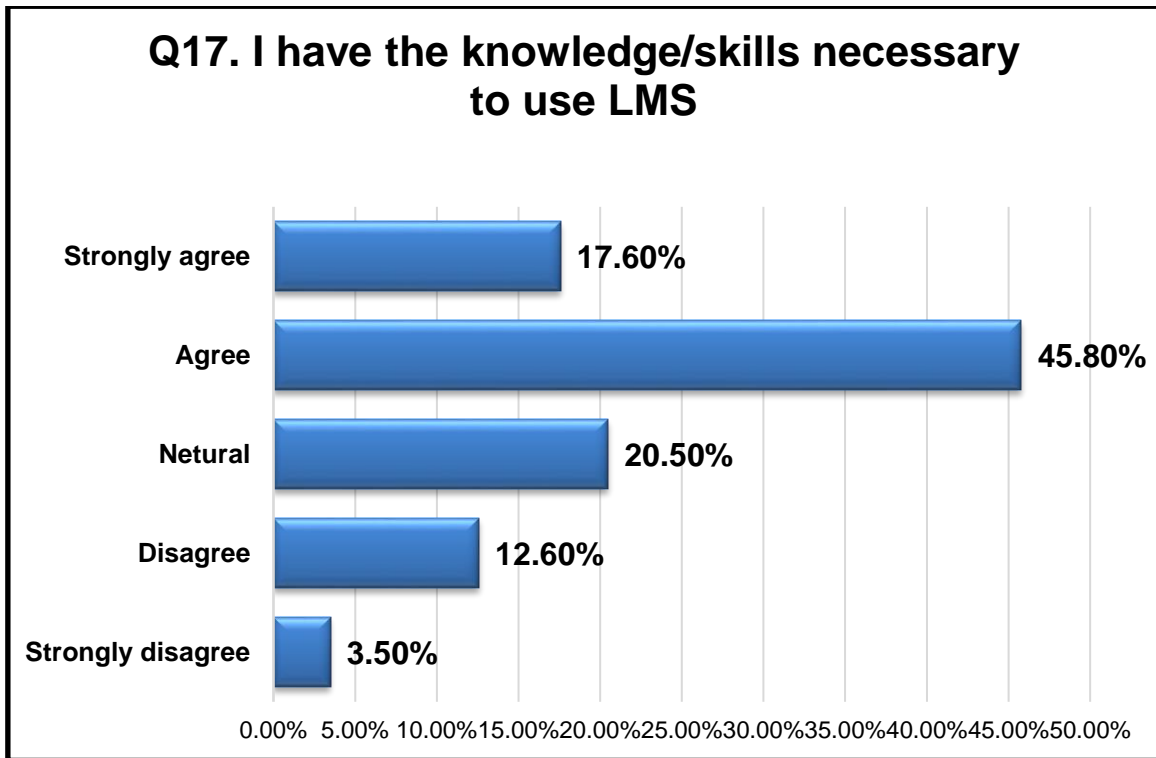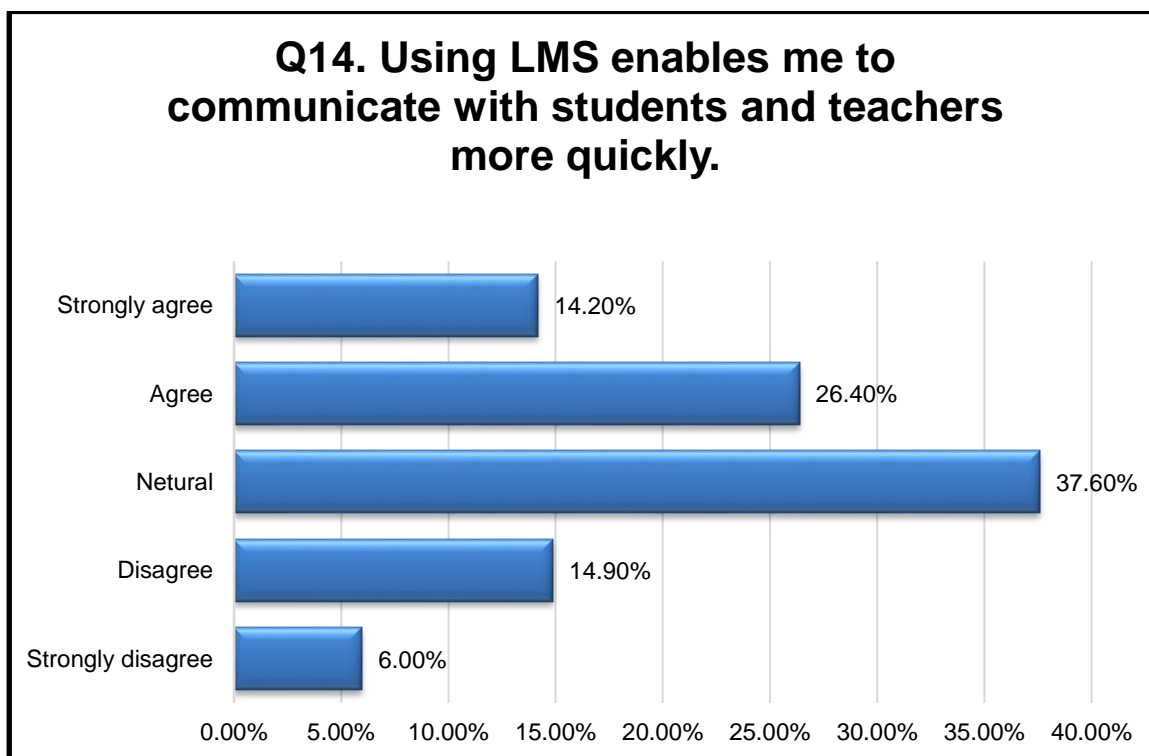

Figure 18: The use of LMS enables students to communicate more quickly

Q27. Using social media enables me to communicate with students and teachers more quickly.

Strongly agree	40.40%
Agree	35.20%
Netural	18.00%
Disagree	4.40%
Strongly disagree	2.00%

0.00% 5.00% 10.00% 15.00% 20.00% 25.00% 30.00% 35.00% 40.00% 45.00%
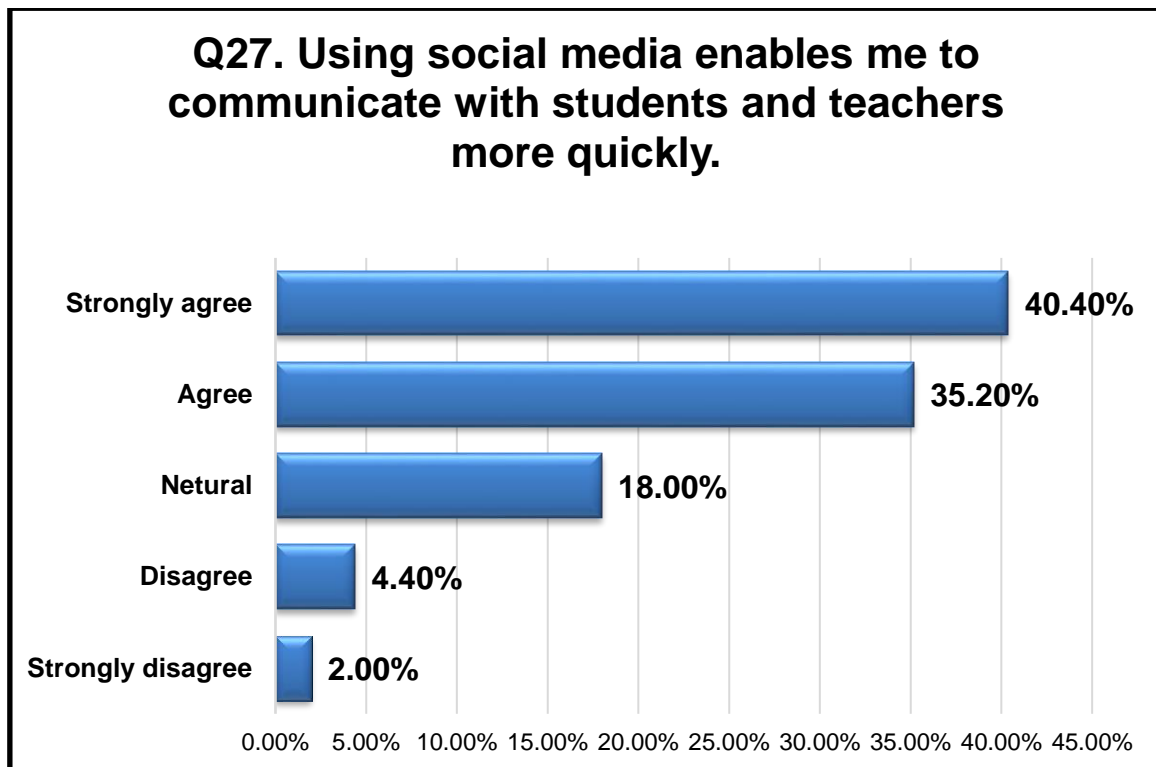
Figure 19: The use of social media enables students to communicate more quickly

5.2.3 Students' enjoyment of LMS and social media use

Regarding the general use of LMS, Figure 20 shows that it is unclear whether students enjoyed using LMS for learning activities, with 39.3%. Only 9.5% of students strongly agree that they enjoy using LMS. From the association rules, 89 students who were neutral about their enjoyment using LMS use it for some of their learning activities, and their universities provide the Blackboard LMS (Num of rules: 20059). Figure 21 demonstrated that students enjoyed using social media more than LMS, with 75.7% stating so. However, 96 of these students use email to communicate with their teachers (Num of rules: 28115). The majority of students enjoyed using social media and they use it for some of their learning activities. Students enjoyed using social media to communicate with each other more than using LMS.

According to the results, the most beneficial way for students to communicate with each other is using social media. This research did not investigate the reasons for students preferring to use social media for this activity. For other activities, students preferred email. However, email is an insecure means of communication and way of submitting assignments.

Q15. I enjoy using LMS

Response	Percentage
Strongly agree	9.50%
Agree	27.60%
Netural	39.30%
Disagree	7.20%
Strongly disagree	6.50%

0.00% 5.00% 10.00% 15.00% 20.00% 25.00% 30.00% 35.00% 40.00% 45.00%
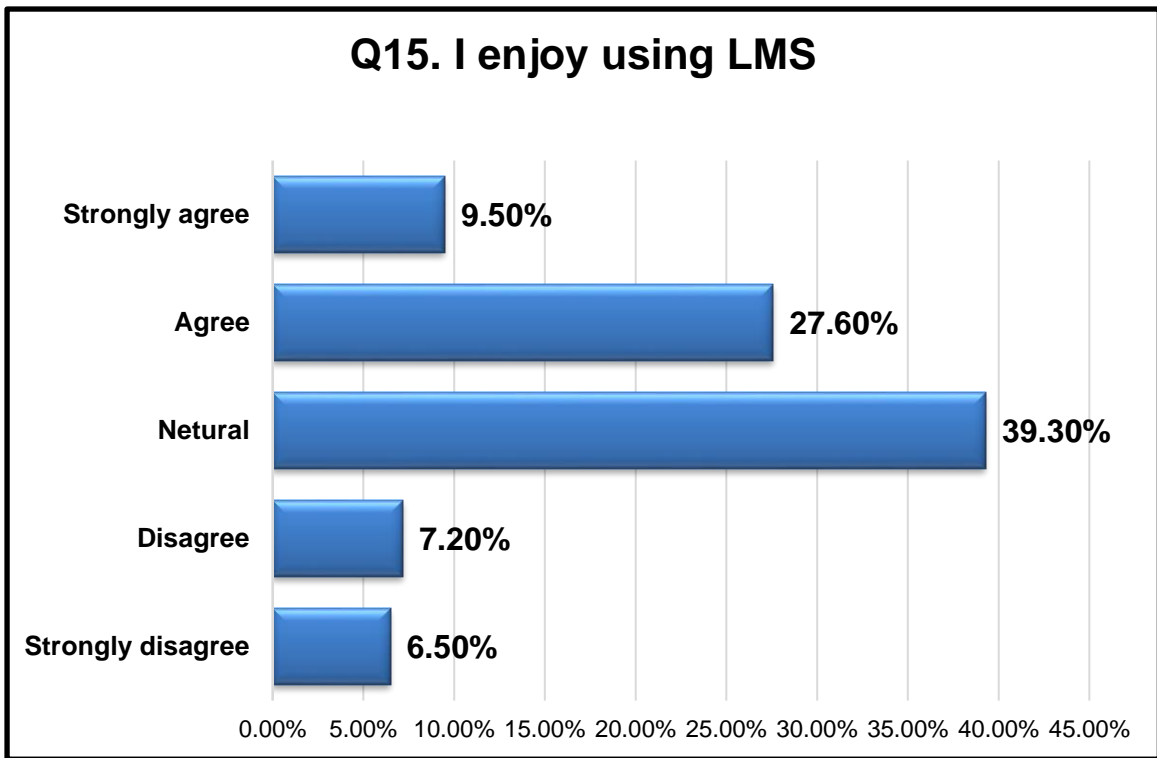
Figure 20: The degree to which students enjoy using LMS

Q28. I enjoy using social media

Response	Percentage
Strongly agree	35.50%
Agree	40.20%
Netural	17.80%
Disagree	4.40%
Strongly disagree	2.20%

0.00% 5.00% 10.00% 15.00% 20.00% 25.00% 30.00% 35.00% 40.00% 45.00%
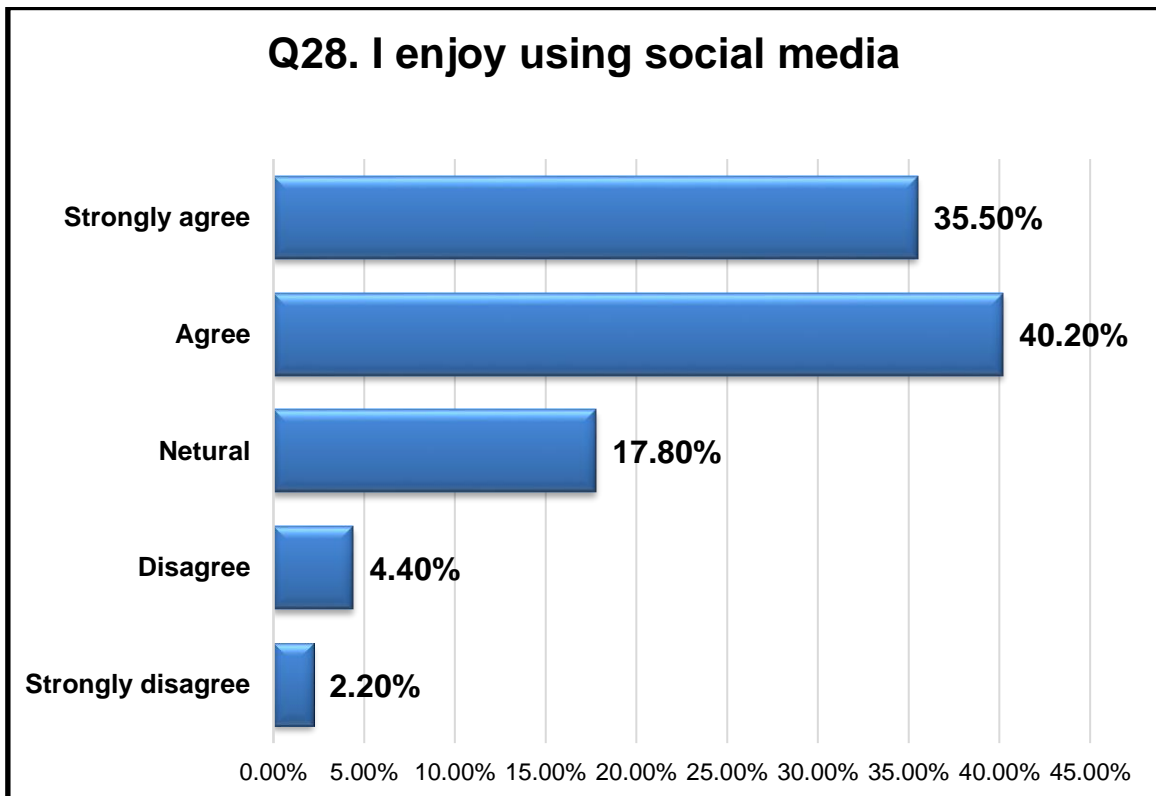
Figure 21: The degree to which students enjoy using social media

5.3 Factors Effecting the Use of LMS and Social Media

5.3.1 Teachers' encouragement

Certain factors have been tested to demonstrate whether they affect the use of LMS and social media. The first factor is teachers' encouragement to their students in using LMS or social media. Figure 22 shows that it is unclear whether teachers encourage their students to use LMS, with 31.3%. From the association rules between using LMS and social media, 90 students who disagreed that their teacher encourages them to use LMS use social media (Num of rules: 43132), and Figure 23 illustrates that 40% of students agreed that their teacher encourages them to use social media to communicate with them. Students who agreed that teachers encouraged the use of social media to communicate with them said they use email to do so (Num of rules: 44570). The majority of students agreed that their universities provide Twitter to deliver learning resources (Num of rules: 31872).
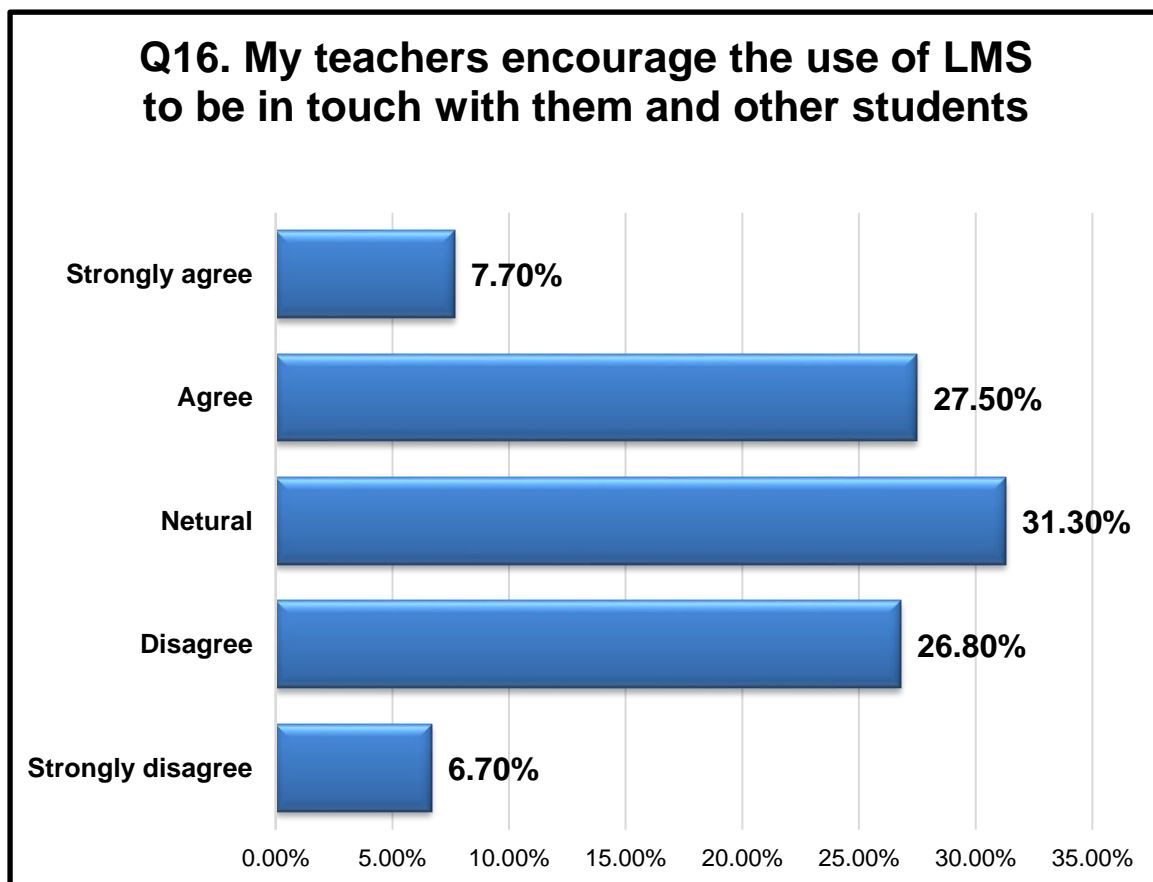
Figure 22: Teachers' encouragement of LMS use
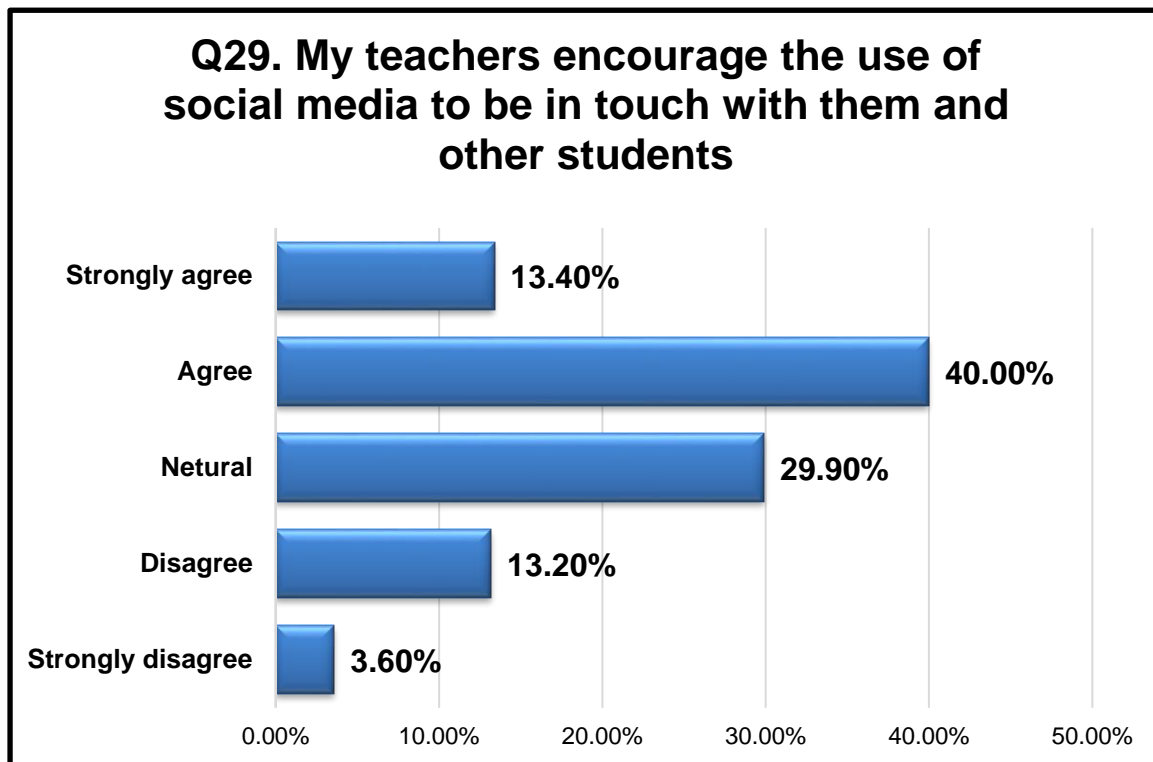
Figure 23: Teachers' encouragement of social media use

5.3.2 Apprehension regarding use of LMS and social media

The second factor is students' apprehension over using LMS and social media. Figure 24 demonstrates that the majority of responses (53.2%) indicated that students did not feel apprehensive using LMS for learning activities. From the association rules, 86 students disagreed that they use LMS for some learning activities (Num of rules: 54754). For social media use, Figure 25 illustrates that 70.9% of students disagreed that they felt apprehensive when using it. However, 93 students use email to communicate with their teachers about their study (Num of rulrs: 65556). Further, 83 students do not feel apprehensive using social media but only use it to communicate with other students about their study (Num of rules: 61040). Students do not feel apprehensive using LMS or social media, and this factor can be considered a non-influencing factor on the use of LMS and social media to deliver learning resources.
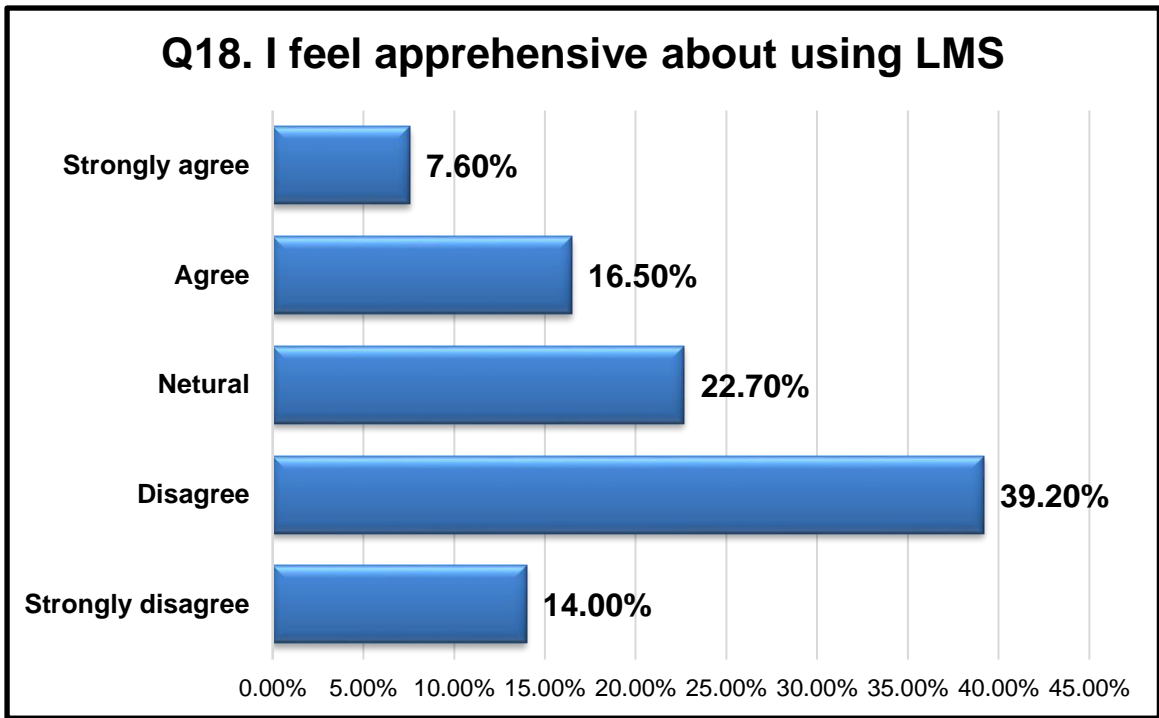
Figure 24: Students' apprehension over using LMS
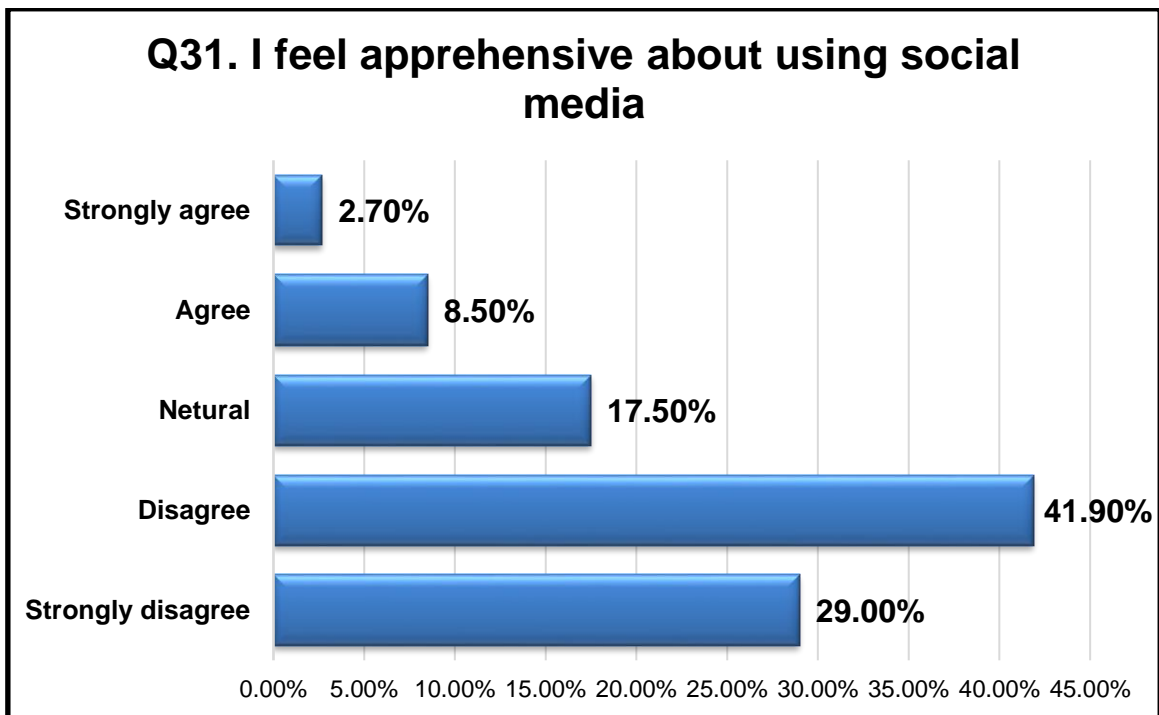
Figure 25: Students' apprehension over using social media

5.3.3 Privacy concerns

Another factor that was tested in this study was students' privacy concerns about making their personal information public by using LMS or social media. Figure 26 shows that fifty-eight percent disagreed that LMS may make their personal information public. From the association rules, 86 students were not worried about their personal information being made public through using LMS. In addition, 70 students use social media and email for learning activities, such as communicating with each other or with their teachers about their study (Num of rules: 9372.). Regarding the use of social media, Figure 27 illustrates that 63.5% of students are not afraid that using social media will make their personal information public. The association rules found that 103 students were not worried about their personal information being made public through social media using email to communicate with teachers (Num of rules: 28734).

Q19. It scares me to think that using LMS can make my personal information public

Strongly agree — 4.70%
Agree — 12.90%
Netural — 24.30%
Disagree — 37.00%
Strongly disagree — 21.10%

0.00% 5.00% 10.00% 15.00% 20.00% 25.00% 30.00% 35.00% 40.00%
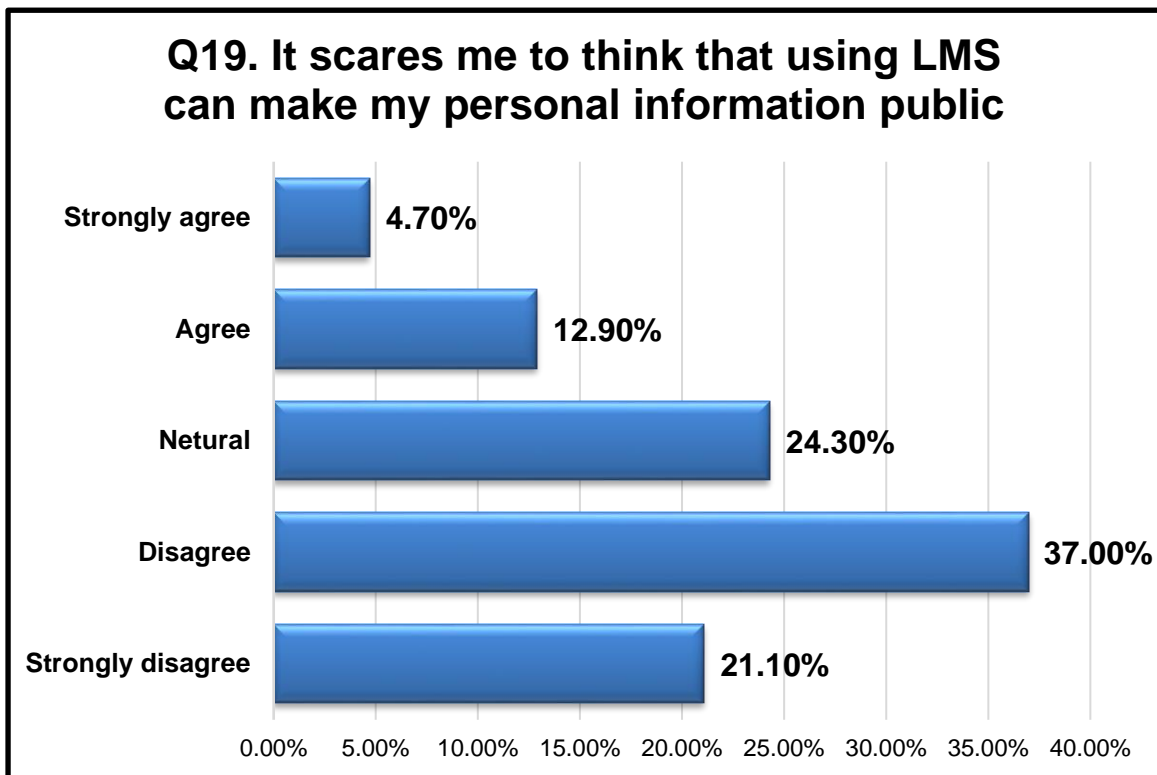
Figure 26: Privacy concerns of students regarding LMS
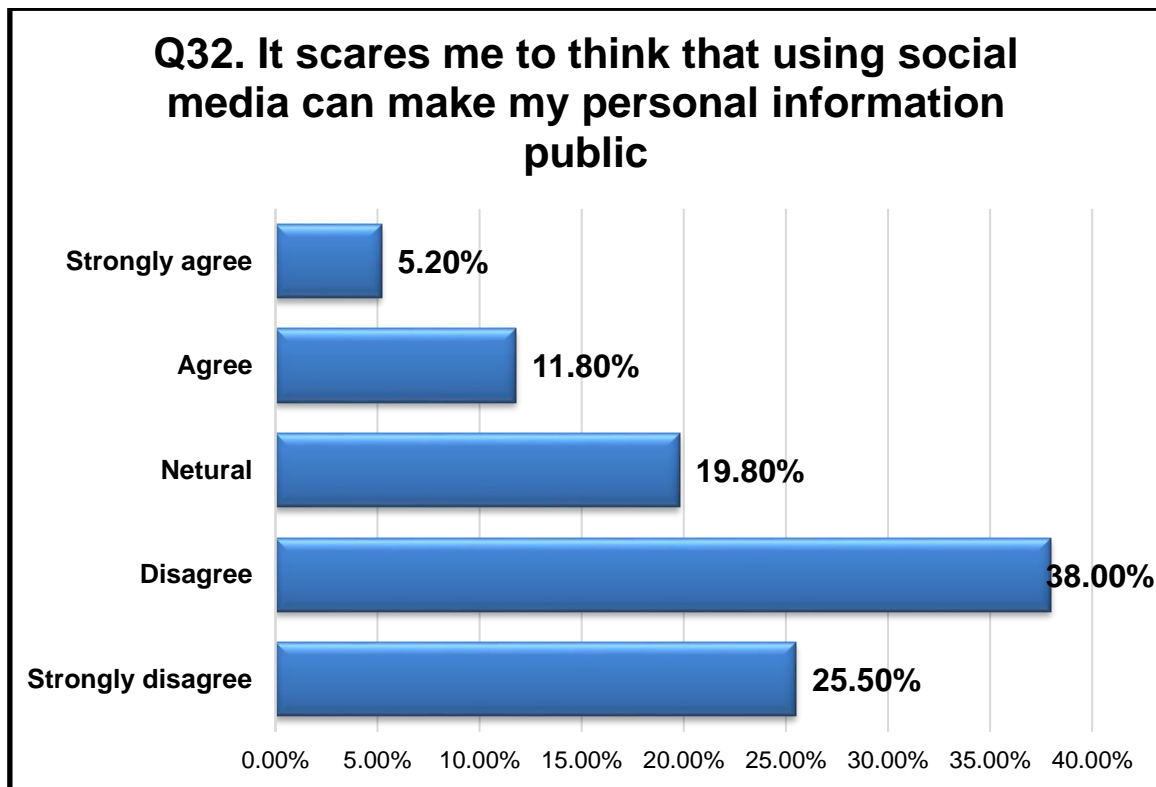
Figure 27: Privacy concerns of students regarding social media

5.3.4 The hesitation to use LMS and social media

The last factor that may affect the use of LMS or social media is students' hesitation to use these technologies for fear of making mistakes that they cannot correct. Figure 28 demonstrates that 31.4% of students disagreed that they hesitate to use LMS for this reason, whereas 20.3% hesitated to use LMS because they fear making a mistake that they cannot correct. From the association rules, 90 students disagreed that they hesitate to use LMS, use social media to communicate with each other, and 70 students of them email to communicate with their teachers (Num of rules: 58453). Regarding social media use, in Figure 29 the majority of students (37.9%) who fear to make a mistake that they cannot correct do not hesitate to use social media. Interestingly, 87 students who do not hesitate to use social media, 70 students of them use email for most of their learning activities, such as communication with their teachers and receiving announcements (Num of rules: 50889).
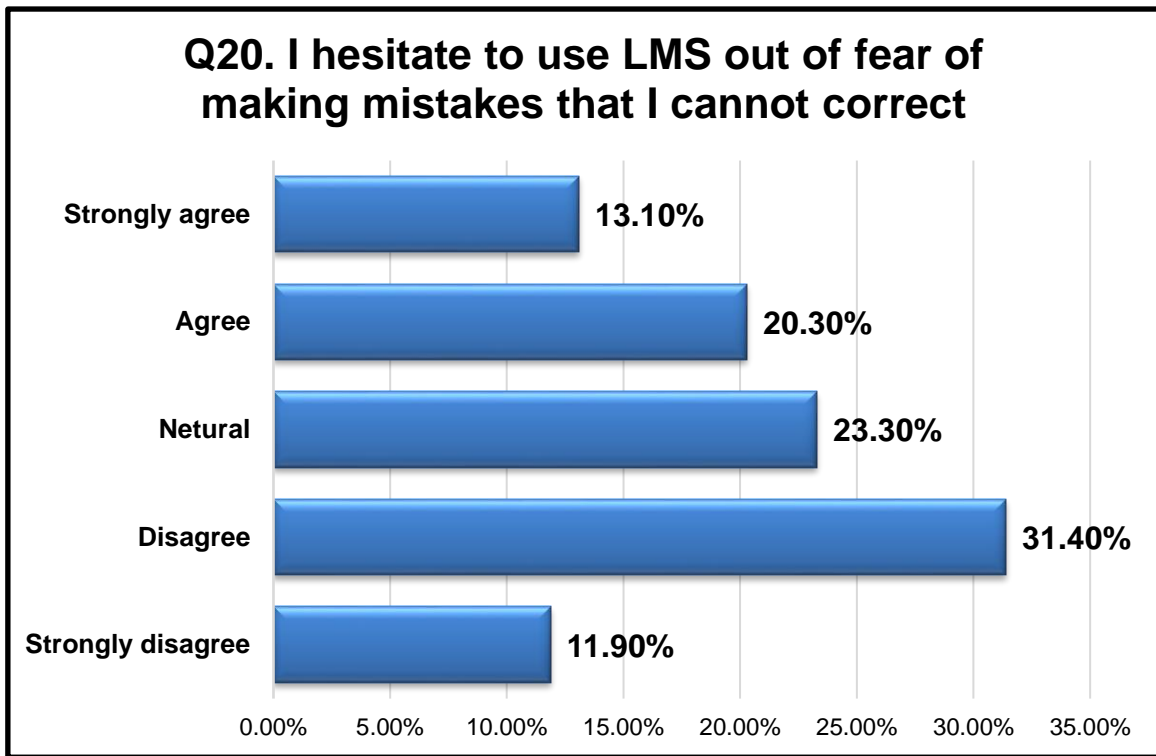
Figure 28: Hesitation over using LMS out of fear of making mistakes
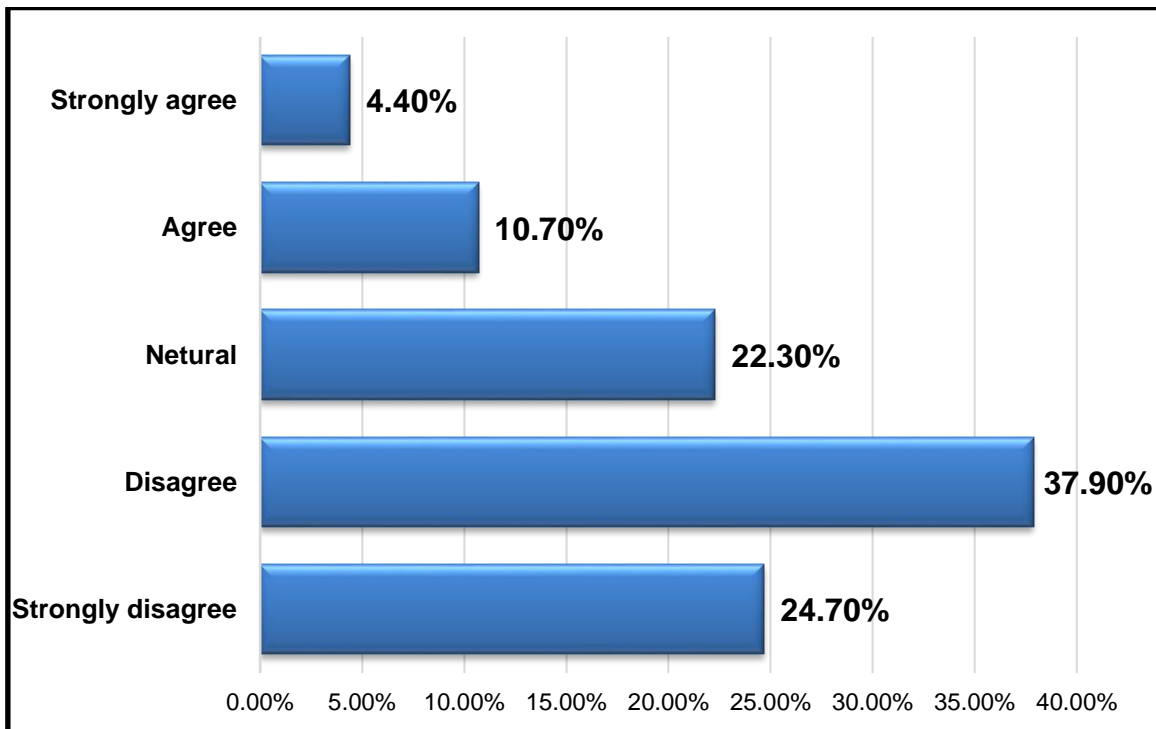
Figure 29: Hesitation over using social media out of fear of making mistakes

This research shows that there is a lack of current LMS use, but universities provide more than one LMS. Blackboard has the highest response (79%), and it is the LMS product that both universities provide. Blackboard is an LMS that provides powerful and easy-to-use systems for learning activities (Bradford et al. 2007). Students have the knowledge necessary to use LMS, and are not apprehensive to use LMS. Further, they are not worried about their privacy and do not hesitate to use it. However, the majority of students were neutral about teachers' encouragement over using LMS. No factors tested in this research caused the lack of LMS use in Saudi universities.

This research shows the current use of social media. Universities provide a variety of types of social media, such as Facebook, Twitter and Instagram. Twitter has the highest response (85.6%), and is the form of social media that both universities provide. Twitter provides some features that could help students in their learning activities. The participants in this research were knowledgeable about using social media, and they enjoyed using it. Further, students do not feel apprehensive using social media or worried about their personal information being made public. However, the privacy of personal information is not guaranteed through social media in general. Students were not hesitant to use social media out of fear of making a mistake that they could not correct.

In Saudi universities, social media is more commonly used than LMS for some activities, such as students' communication with each other. Conversely, LMS is more used than social media for submitting assignments. However, the majority of students prefer to use email to submit their assignments. For other activities—such as students' communication with their teachers and receiving announcements—students used email instead of LMS or social media.

All the responses for the influencing factors on using LMS and social media were counter-intuitive, as students do not use LMS and social media to deliver learning resources properly. The barriers to, and factors that cause weaknesses in, the use of LMS and social media are unclear. Students prefer to use email for most learning activities, and this is an insecure way to deliver learning resources and conduct learning activities. This research did not test all factors and barriers that may affect the use of LMS and social media in Saudi universities. Consequently, the output of this research includes a study to decide the beneficial way of delivering learning resources in Saudi universities.

6. CONCLUSION

This chapter provides recommendations to conclude this study and to clarify the objectives of this research. This research found that the most-used LMS at Saudi universities was Blackboard. Saudi universities also used a variety of social media types. However, neither university used LMS and social media for all learning activities. This research has identified the way that students prefer to do certain activities. The outcomes of this research will help Saudi universities to know the current use of LMS and social media. They will also assist universities in developing LMS and social media in order to deliver learning resources to students. However, the survey of this study was a pilot survey; and the validity of of the survey instrument would not be proven until there is a follow up survey.

6.1 Recommendations

This study provides several recommendations that may help Saudi universities to develop LMS and social media and improve the factors that affect the use of these technologies. The recommendations below are based on the research results.

6.1.1 Recommendation 1: Educate students about the features of LMS

There are many features of LMS that students do not use them in their learning activities. LMS are designed to help students access their learning materials and undertake learning activities easily and efficiently. Faculty members could educate students about the appropriate way to undertake learning activities. It is recommended that students know that LMS guarantee that teachers receive submitted assignments. Further, LMS provides study materials securely, meaning that students can download any file from their university LMS without the threat of harmful viruses. Although students have the knowledge to use LMS, the level of knowledge is not enough to use LMS properly. Teachers could show students how they can use LMS to better access learning materials.

6.1.2 Recommendation 2: Universities need to improve the use of LMS features

Students used LMS only to submit their assignments, and use email and social media for other activities. LMS provides all the features that enable teachers and students to deliver learning resources. However, there is underuse of features in LMS and universities could make use of more LMS features provided. This is could be done by teachers, they could post their announcements on LMS and communicate with their students using LMS channels.

6.1.3 Recommendation 3: Develop the communication features of LMS

Students preferred to use social media to communicate with each other, and email to communicate with their teachers. However, LMS provides communication channels that allow students to

communicate securely and easily. Teachers could activate communication channels and encourage students to contact them through LMS communication channels. These channels are designed based on students' privacy and security. It is recommended that Universities discover the reasons for limitations in the use of communication channels provided by LMS.

6.1.4 Recommendation 4: Moving from Blackboard to other LMS

Blackboard is the most-used LMS in Saudi universities, but students do not use it for all learning activities. The Saudi Ministry of Higher Education could try to use another LMS that may be easier for teachers and students. Blackboard is not open-source software, and it is considered to be an expensive LMS (Machado & Tao 2007). Universities could move to another free, open-source LMS, such as Moodle. Some participants of this study stated that their university uses Moodle. Students and teachers may find Moodle easier and more enjoyable to use than Blackboard. The reason for lack of LMS use may be the product of the LMS.

6.1.5 Recommendation 5: Develop awareness about social media privacy

From the research results it was found that students use social media to communicate with each other. They were not worried that social media may make their personal information public. It is recommended that faculty members educate students about LMS' privacy; for example, if students want to discuss their study without disclosing personal information to log in, as social media requests. Universities could provide workshops for all students to make them aware of the danger of providing social media with personal information. Further, Saudi universities could undertake some studies to determine students' level of knowledge about social media privacy.

6.1.6 Recommendation 6: Improve the use of other types of social media

Twitter is the social media most used in Saudi universities to deliver learning resources. Universities could expand this to include all types of social media that students like to use for learning activities. It is recommednded that faculty members use a variety of social media types that allow them to deliver learning resources easily and quickly. Saudi universities could use social media to post announcements and communicate with students.

6.1.7 Recommendation 7: Develop awareness of the security weaknesses of email

Although students prefer email as a way of submitting assignments, there are many disadvantages to using email for learning activities. Email is considered to be an insecure way of exchanging files. An email may contain viruses that could damage computers, or teachers' emails may be broken into by hackers, meaning that students would not be able to communicate with their teachers. However, LMS provide discussion boards that are guaranteed to receive messages and avoid security problems. Students could learn about the security weaknesses of email to avoid any security problems. It is recommended that Universities provide workshops for all students to educate them.

6.2 Future Work

This research has given an overview of the current use of LMS and social media in Saudi universities. It has discussed some barriers that may affect the use of LMS and social media. Further research on the use of LMS in Saudi universities could be conducted to determine the barriers to its implementation.

More research is also required to discover the learning activities that students could undertake using social media. Research could investigate the other types of social media that students prefer to use for learning activities, or the variety of social media features that make the delivery of learning resources easy and efficient for students and teachers. Another area that could be discussed is the use of email in Saudi universities for delivering learning resources, and the security issues related to this.

Only two universities in the capital city of Saudi Arabia, Riyadh, were involved in this research. Further research could expand this study to include all universities in Saudi Arabia. Further, this study examined the perspectives of students, so further research could examine the perspectives of faculty members.

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APPENDICES

Appendix A:

SURVEY

Please tick all that apply

1. What is your age?

a) 18   b) 19-20   c) 21-22   d) 23-24   e) 25 and more

2. What is your gender?

a) Male   b) Female

3. What is your year of study?

a) The preparatory year   b) Year 1   c) Year 2   d) Year 3   e) Year 4   f) Year 5…

4. Do you own a computer or mobile device (eg: smart phone, Tablet, ipad)?

Yes ☐   No ☐

5. Do you have Internet access at university?

Yes ☐   No

6. How do you rate your computer skills?

a) Non-user   b) Beginner   c) Intermediate   c) Advanced

7. Does your university deliver learning resources by….

   a) Learning Management System (LMS)   b) Social media   c) Email   d) others
    (please specify) ………………….…

    -If your answer a go to Q8-Q20
    -If your answer b go to Q 21-Q33
    -If your answer c &d go to Q34-Q37

8. What type of Learning Management System does your university provide?

a) Blackboard   b) moodle   c) Jusur   d) others (please specify) ….

9. Which statement best indicates how you use a LMS in your current learning duties? Please, pick only one statement.

a. My university has a LMS, but I do not use it.	
b. I use a LMS for some learning activities.	
c. I use a LMS for many learning activities.	
d. I use a LMS for almost all learning activities.	

10. How do students communicate with their teachers about their studies?

     a) LMS   b) social media   c) Email   d) others …

11. How do students communicate with each other about their studies?

     a) LMS   b) social media   c) Email   d) others …

12. How do your teachers make announcements?

     a) LMS   b) social media   c) Email   d) others …

13. How do students submit their assignments?

     a) LMS   b) social media   c) Email   d) others …

14. Using LMS enables me to communicate with students and teachers more quickly.

1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

15. I enjoy using LMS.

1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

16. My teachers encourage the use of LMS to be in touch with them and other students.

1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

17. I have the knowledge -skills- necessary to use LMS.

1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

18. I feel apprehensive about using LMS.

1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

19. It scares me to think that using LMS makes my personal information public.

1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

20. I hesitate to use LMS for fear of making mistakes that I cannot correct.

1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

You have complete the survey, thanks for your volunteering.

……………………………………………………………………………

21. What type of social media do your university use it to deliver learning resources?

a) Facebook   b) Twitter c) Instagram   d) others……

22. Which statement best indicates how you use a social media in your current learning duties? Please, pick only one statement.

a. My university has a social media, but I do not use it.	
b. I use a social media for some learning activities.	
c. I use a social media for many learning activities.	
d. I use a social media for almost all learning activities.	

23. How do students communicate with their teachers about their studies?

      a) LMS   b) social media   c) Email   d) others …

24. How do students communicate with each other about their studies?

      a) LMS   b) social media   c) Email   d) others …

25. How do your teachers make announcements?

      a) LMS   b) social media   c) Email   d) others …

26. How do students submit their assignments?

      a) LMS   b) social media   c) Email   d) others …

27. Using social media enables me to communicate with students and teachers more quickly.

1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

28. I enjoy using social media.
1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

29. My teachers encourage the use of social media to be in touch with them and other students.
1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

30. I have the knowledge -skills- necessary to use social media.
1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

31. I feel apprehensive about using social media.
1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

32. It scares me to think that using social media make my personal information public
1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

33. I hesitate to use social media for fear of making mistakes that I cannot correct.
1) Strongly agree   2) Agree   3) Neutral   4) Disagree   5) Strongly disagree

34. How do students communicate with their teachers about their studies?
    a) LMS   b) social media   c) Email   d) others …

35. **How do students communicate with each other about their studies?**
    a) LMS   b) social media   c) Email   d) others …

36. How do your teachers make announcements?
    a) LMS   b) social media   c) Email   d) others …

37. How do students submit their assignments?
    a) LMS   b) social media   c) Email   d) others …

You have completed the survey, thanks for your volunteering.

Appendix B

The approval of ethics committee

FINAL APPROVAL NOTICE

Project No.: | 7088

Project Title: | Comparison of using Learning Management Systems (LMS) versus social media sites for delivery of learning resources in Saudi Universities

Principal Researcher: | Mrs Marahib Alrashdi

Email: | alra0099@uni.flinders.edu.au

Approval Date: | 17 November 2015 | Ethics Approval Expiry Date: | 31 July 2018

The above proposed project has been **approved** on the basis of the information contained in the application, its attachments and the information subsequently provided with the addition of the following comment(s):

Appendix C

Information Sheet and Letter of Introduction

Mrs Marahib Alrashdi
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Email: alra0099@uni.flinders.edu.au
CRICOS Provider No. 00114A

INFORMATION SHEET

Title: Comparison of using Learning Management Systems (LMS) versus social media sites for delivery of learning resources in Saudi Universities.

Researchers:
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Description of the study:
This study is part of the project entitled 'Comparison of using Learning Management Systems (LMS) versus social media sites for delivery of learning resources in Saudi Universities'. This project will Compare using Learning Management Systems (LMS) versus social media sites for delivery of learning resources in Saudi Universities, and Investigate the problems and barriers that may arise using LMS as well as social media sites, and explore the factors for using LMS and Social media sites.

This project is supported by Flinders University, School of Computer Science, Engineering and Mathematics department.

Purpose of the study:
This project aims to compare the use of Learning Management Systems (LMS) versus social media sites for delivery of learning resources in Saudi Universities

- Define the features of LMS and Social media that the universities use it.
- Investigate the problems and barriers that occur when using LMS or Social media sites.

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achievement

What benefit will I gain from being involved in this study?
The sharing of your experiences will help in identifying the barriers that affect the use of LMS and social media to deliver learning resources in Saudi universities. We are very keen to identify the useful features of using LMS and social media that help students to access to their learning materials. The results of the study will help Saudi universities to define the features of LMS or social media that will ease any difficulties in the learning process in the future.

Will I be identifiable by being involved in this study?
We do not need your name and you will be anonymous. Your comments cannot be linked to you.

Are there any risks or discomforts if I am involved?
The researcher anticipates few risks from your involvement in this study. If you have any concerns regarding anticipated or actual risks or discomforts, please raise them with the researcher. The researcher can be contacted by phone or by email.

How do I agree to participate?
Participation is voluntary. You may answer 'no comment' or refuse to answer any questions at any time without effect or consequences.

How will I receive feedback?
A copy of the final report including the results of the survey will be send to the library of your university.

If you have any concerns or questions regarding this research, please feel free to contact the researcher Mrs. Marahib by email to (alra0099@uni.flinders.edu.au) or the supervisor Dr Denise de Vries on +61 8 8201 3639 or by to email (Denise.deVries@flinders.edu.au).

Thank you for taking the time to read this information sheet and we hope that you will accept our invitation to be involved.

Dr Denise de Vries
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es

CRICOS Provider No. 00114A

7 October 2015

LETTER OF INTRODUCTION
(From Supervisor)

Dear Participant,

This letter is to introduce Mrs. Marahib Alrashdi who is a master student in the School of Computer Science, Engineering and Mathematics at Flinders University in Australia. She will produce his student card, which carries a photograph, as a proof of identity.

Marahib is undertaking research leading to the production of a thesis on the subject of "Comparison of using Learning Management Systems (LMS) versus social media sites for delivery of learning resources in Saudi Universities".

She would be most grateful if you could volunteer to assist in this project by agreeing to be involved to completing a questionnaire which covers certain aspects of this topic. No more than 20 minutes of your time would be required to answer the questionnaire

Be assured that any information provided will be treated in the strictest confidence and none of the participants will be individually identifiable in the resulting thesis, report or other publications. You are, of course, entirely free to discontinue your participation at any time or to decline to answer particular questions.

Any enquiries you may have concerning this project should be directed to me at the address given above or by telephone on (+61 8 82013639) or by email (denise.devries@flinders.edu.au). Marahib can be contacted in the local number on +966 580000754 or by email (alra0099@uni.flinders.edu.au).

Thank you for your attention and assistance.

Yours sincerely

Dr Denise de Vries
Lecturer
School of Computer Science, Engineering and Mathematics
Flinders University

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ABN 65 524 596 282 CRICOS Provider No. 00114A

Appendix D

The tables of the results from WEKA

Missing: Number (or percentage) of students who missed this question.
Distinct: students could choose more than one answer for some of the survey questions, distinct variable illustrated the number of options that weka found it is distinct from othe options for each question.
Label: list of all potential options.
Count: Number of students who select this option.

Name: Q1
Missing: 0 (0%)   Distinct: 5   Type: Nominal

No.	Label	Count
1.	18andless	18
2.	21-22	179
3.	23-24	57
4.	19-20	166
5.	25andover	31

Name: Q2
Missing: 0 (0%)   Distinct: 2   Type: Nominal

No.	Label	Count
1.	Female	310
2.	Male	141

Name: Q3
Missing: 0 (0%)   Distinct:6   Type: Nominal

No.	Label	Count
1.	Third	91
2.	Fourth	55
3.	Second	88
4.	Fifth	72
5.	First	103
6.	Preparatory	42

Name: Q6
Missing: 0 (0%)   Distinct:3   Type: Nominal

No.	Label	Count
1.	Non-user	0
2.	Average	232
3.	Advanced	192
4.	Beginner	27

Name: Q7
Missing: 0 (0%)   Distinct: 14   Type: Nominal

No.	Label	Count
1.	LMS	72
2.	Socialmedia	13
3.	Email	56
4.	Other	4
5.	LMS Socialmedia	12
6.	LMSEmail	101
7.	LMSOther	4
8.	SocialmediaLMS	0
9.	SocialmediaEmail	52
10.	SocialmediaOther	0
11.	EmailLMS	0
12.	Email Socialmedia	0
13.	EmailOther	2
14.	OtherLMS	0
15.	Other Socialmedia	0
16.	OtherEmail	0
17.	LMS SocialmediaEmail	120

No.		
18.	LMSEmailOther	1
19.	LMS SocialmediaOther	0
20.	SocialmediaEmailOther	1
21.	LMS SocialmediaEmailOther	6
22.	NA	7

Name: Q8
Missing: 0 (0%)   Distinct: 5   Type: Nominal

No.	Label	Count
1.	Blackboard	360
2.	Moodle	7
3.	Jusur	6
4.	Other	5
5.	BlackboardMoodle	0
6.	BlackboardJusur	0
7.	BlackboardOther	0
8.	Moodle Blackboard	0
9.	MoodleJusur	0
10.	MoodleOther	0
11.	Jusur Blackboard	0
12.	JusurMoodle	0
13.	JusurOther	0
14.	Other Blackboard	0
15.	OtherMoodle	0
16.	OtherJusur	0
17.	BlackboardMoodleJusur	0

No.		Count
18.	BlackboardJusurOther	0
19.	BlackboardMoodleOther	0
20.	MoodleJusurOther	0
21.	BlackboardMoodleJusurOther	0
22.	NA	73

Name: Q9
Missing: 0 (0%)   Distinct: 5   Type: Nominal

No.	Label	Count
1.	Notuseit	79
2.	Someactivities	221
3.	Manyactivities	83
4.	Almostall	18
5.	NA	50

Name: Q10
Missing: 0 (0%)   Distinct: 13   Type: Nominal

No.	Label	Count
1.	LMS	7
2.	Socialmedia	21
3.	Email	155
4.	Other	2
5.	LMS Socialmedia	1
6.	LMSEmail	42
7.	LMSOther	0
8.	SocialmediaLMS	0
9.	SocialmediaEmail	124
10.	SocialmediaOther	0

No.	Label	Count
11.	EmailLMS	0
12.	Email Socialmedia	0
13.	EmailOther	6
14.	OtherLMS	0
15.	Other Socialmedia	0
16.	OtherEmail	0
17.	LMS SocialmediaEmail	37
18.	LMSEmailOther	2
19.	LMS SocialmediaOther	0
20.	SocialmediaEmailOther	2
21.	LMS SocialmediaEmailOther	3
22.	NA	49

Name: Q11
Missing: 0 (0%)   Distinct: 5   Type: Nominal

No.	Label	Count
1.	LMS	6
2.	Socialmedia	316
3.	Email	50
4.	Other	27
5.	LMS Socialmedia	0
6.	LMSEmail	0
7.	LMSOther	0
8.	SocialmediaLMS	0
9.	SocialmediaEmail	0
10.	SocialmediaOther	0

No.	Label	Count
11.	EmailLMS	0
12.	Email Socialmedia	0
13.	EmailOther	0
14.	OtherLMS	0
15.	Other Socialmedia	0
16.	OtherEmail	0
17.	LMS SocialmediaEmail	0
18.	LMSEmailOther	0
19.	LMS SocialmediaOther	0
20.	SocialmediaEmailOther	0
21.	LMS SocialmediaEmailOther	0
22.	NA	52

Name: Q12
Missing: 0 (0%)   Distinct: 9   Type: Nominal

No.	Label	Count
1.	LMS	66
2.	Socialmedia	76
3.	Email	243
4.	Other	6
5.	LMS Socialmedia	0
6.	LMSEmail	3
7.	LMSOther	0
8.	SocialmediaLMS	0
9.	SocialmediaEmail	3
10.	SocialmediaOther	0

No.	Label	Count
11.	EmailLMS	0
12.	Email Socialmedia	0
13.	EmailOther	2
14.	OtherLMS	0
15.	Other Socialmedia	0
16.	OtherEmail	0
17.	LMS SocialmediaEmail	0
18.	LMSEmailOther	0
19.	LMS SocialmediaOther	0
20.	SocialmediaEmailOther	0
21.	LMS SocialmediaEmailOther	3
22.	NA	49

Name: Q13
Missing: 0 (0%)   Distinct: 10   Type: Nominal

No.	Label	Count
1.	LMS	131
2.	Socialmedia	5
3.	Email	186
4.	Other	57
5.	LMS Socialmedia	0
6.	LMSEmail	5
7.	LMSOther	4
8.	SocialmediaLMS	0
9.	SocialmediaEmail	0
10.	SocialmediaOther	0

No.	Label	Count
11.	EmailLMS	0
12.	Email Socialmedia	0
13.	EmailOther	7
14.	OtherLMS	0
15.	Other Socialmedia	0
16.	OtherEmail	0
17.	LMS SocialmediaEmail	0
18.	LMSEmailOther	1
19.	LMS SocialmediaOther	0
20.	SocialmediaEmailOther	0
21.	LMS SocialmediaEmailOther	1
22.	NA	54

Name: Q14
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	Stronglyagree	57
2.	Agree	110
3.	Neutral	151
4.	Disagree	60
5.	Stronglydisagree	24
6.	NA	49

Name: Q15
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	Stronglyagree	38
2.	Agree	111
3.	Neutral	158

No.	Label	Count
4.	Disagree	69
5.	Stronglydisagree	26
6.	NA	49

Name: Q16
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	Stronglyagree	31
2.	Agree	111
3.	Neutral	126
4.	Disagree	108
5.	Stronglydisagree	27
6.	NA	48

Name: Q17
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	Stronglyagree	71
2.	Agree	185
3.	Neutral	83
4.	Disagree	51
5.	Stronglydisagree	14
6.	NA	47

Name: Q18
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	Stronglyagree	31
2.	Agree	67
3.	Neutral	92

No.		Count
4.	Disagree	159
5.	Stronglydisagree	57
6.	NA	45

Name: Q19
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	Stronglyagree	19
2.	Agree	52
3.	Neutral	98
4.	Disagree	149
5.	Stronglydisagree	85
6.	NA	48

Name: Q20
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	Stronglyagree	53
2.	Agree	82
3.	Neutral	94
4.	Disagree	127
5.	Stronglydisagree	48
6.	NA	47

Name: Q21
Missing: 0 (0%)   Distinct: 8   Type: Nominal

No.	Label	Count
1.	Facebook	5
2.	Twitter	321
3.	Instagram	5

No.	Label	Count
4.	Other	37
5.	FacebookTwitter	0
6.	FacebookInstagram	0
7.	FacebookOther	0
8.	Twitter Facebook	0
9.	TwitterInstagram	2
10.	TwitterOther	2
11.	InstagramFacebook	0
12.	InstagramTwitter	0
13.	InstagramOther	0
14.	OtherFacebook	0
15.	OtherTiwtter	0
16.	OtherInstagram	0
17.	FacebookTwitterInstagram	0
18.	FacebookTwitterOther	0
19.	FacebookInstagramOther	0
20.	TwitterInstagramOther	0
21.	FacebookTwitterInstagramOther	3
22.	NA	76

Name: Q22
Missing: 0 (0%)   Distinct: 5   Type: Nominal

No.	Label	Count
1.	Notuseit	39
2.	Someactivities	183
3.	Manyactivities	120

No.		Count
4.	Almostall	46
5.	NA	63

Name: Q23
Missing: 0 (0%)   Distinct: 7   Type: Nominal

No.	Label	Count
1.	LMS	15
2.	Socialmedia	62
3.	Email	301
4.	Other	0
5.	LMS Socialmedia	0
6.	LMSEmail	0
7.	LMSOther	0
8.	SocialmediaLMS	0
9.	SocialmediaEmail	5
10.	SocialmediaOther	0
11.	EmailLMS	0
12.	Email Socialmedia	0
13.	EmailOther	1
14.	OtherLMS	0
15.	Other Socialmedia	0
16.	OtherEmail	0
17.	LMS SocialmediaEmail	0
18.	LMSEmailOther	0
19.	LMS SocialmediaOther	0
20.	SocialmediaEmailOther	0

No.		Count
21.	LMS SocialmediaEmailOther	2
22.	NA	65

Name: Q24
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	LMS	4
2.	Socialmedia	323
3.	Email	49
4.	Other	2
5.	LMS Socialmedia	0
6.	LMSEmail	0
7.	LMSOther	0
8.	SocialmediaLMS	0
9.	SocialmediaEmail	1
10.	SocialmediaOther	0
11.	EmailLMS	0
12.	Email Socialmedia	0
13.	EmailOther	0
14.	OtherLMS	0
15.	Other Socialmedia	0
16.	OtherEmail	0
17.	LMS SocialmediaEmail	0
18.	LMSEmailOther	0
19.	LMS SocialmediaOther	0
20.	SocialmediaEmailOther	0

No.	Label	Count
21.	LMS SocialmediaEmailOther	0
22.	NA	72

Name: Q25
Missing: 0 (0%)   Distinct: 10   Type: Nominal

No.	Label	Count
1.	LMS	53
2.	Socialmedia	89
3.	Email	215
4.	Other	6
5.	LMS Socialmedia	0
6.	LMSEmail	1
7.	LMSOther	0
8.	SocialmediaLMS	0
9.	SocialmediaEmail	4
10.	SocialmediaOther	1
11.	EmailLMS	0
12.	Email Socialmedia	0
13.	EmailOther	1
14.	OtherLMS	0
15.	Other Socialmedia	0
16.	OtherEmail	0
17.	LMS SocialmediaEmail	0
18.	LMSEmailOther	0
19.	LMS SocialmediaOther	0
20.	SocialmediaEmailOther	0

No.		Count
21.	LMS SocialmediaEmailOther	3
22.	NA	78

Name: Q26
Missing: 0 (0%)   Distinct: 8   Type: Nominal

No.	Label	Count
1.	LMS	96
2.	Socialmedia	12
3.	Email	200
4.	Other	47
5.	LMS Socialmedia	0
6.	LMSEmail	1
7.	LMSOther	1
8.	SocialmediaLMS	0
9.	SocialmediaEmail	0
10.	SocialmediaOther	0
11.	EmailLMS	0
12.	Email Socialmedia	0
13.	EmailOther	0
14.	OtherLMS	0
15.	Other Socialmedia	0
16.	OtherEmail	6
17.	LMS SocialmediaEmail	0
18.	LMSEmailOther	0
19.	LMS SocialmediaOther	0
20.	SocialmediaEmailOther	0

21.	LMS SocialmediaEmailOther	0
22.	NA	88

Name: Q27
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	Stronglyagree	148
2.	Agree	129
3.	Neutral	66
4.	Disagree	16
5.	Stronglydisagree	7
6.	NA	85

Name: Q28
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	Stronglyagree	130
2.	Agree	147
3.	Neutral	65
4.	Disagree	16
5.	Stronglydisagree	8
6.	NA	85

Name: Q29
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	Stronglyagree	49
2.	Agree	146
3.	Neutral	109
4.	Disagree	48
5.	Stronglydisagree	13

No.	Label	Count
6.	NA	86

Name: Q30
Missing: 0 (0%)   Distinct: 5   Type: Nominal

No.	Label	Count
1.	Stronglyagree	191
2.	Agree	130
3.	Neutral	35
4.	Disagree	9
5.	Stronglydisagree	0
6.	NA	86

Name: Q31
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	Stronglyagree	10
2.	Agree	31
3.	Neutral	64
4.	Disagree	153
5.	Stronglydisagree	107
6.	NA	86

Name: Q32
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	Stronglyagree	19
2.	Agree	43
3.	Neutral	72
4.	Disagree	137
5.	Stronglydisagree	93

6.	NA	87

Name: Q33
Missing: 0 (0%)   Distinct: 6   Type: Nominal

No.	Label	Count
1.	Stronglyagree	16
2.	Agree	39
3.	Neutral	81
4.	Disagree	138
5.	Stronglydisagree	90
6.	NA	87

Name: Q34
Missing: 0 (0%)   Distinct: 7   Type: Nominal

No.	Label	Count
1.	LMS	21
2.	Socialmedia	35
3.	Email	321
4.	Other	1
5.	LMS Socialmedia	0
6.	LMSEmail	0
7.	LMSOther	0
8.	SocialmediaLMS	0
9.	SocialmediaEmail	0
10.	SocialmediaOther	0
11.	EmailLMS	0
12.	Email Socialmedia	3
13.	EmailOther	0

No.	Label	Count
14.	OtherLMS	0
15.	Other Socialmedia	0
16.	OtherEmail	0
17.	LMS SocialmediaEmail	0
18.	LMSEmailOther	0
19.	LMS SocialmediaOther	0
20.	SocialmediaEmailOther	0
21.	LMS SocialmediaEmailOther	2
22.	NA	68

Name: Q35
Missing: 0 (0%)   Distinct: 7   Type: Nominal

No.	Label	Count
1.	LMS	8
2.	Socialmedia	292
3.	Email	68
4.	Other	3
5.	LMS Socialmedia	0
6.	LMSEmail	0
7.	LMSOther	0
8.	SocialmediaLMS	0
9.	SocialmediaEmail	1
10.	SocialmediaOther	0
11.	EmailLMS	0
12.	Email Socialmedia	1
13.	EmailOther	0

No.	Label	Count
14.	OtherLMS	0
15.	Other Socialmedia	0
16.	OtherEmail	0
17.	LMS SocialmediaEmail	0
18.	LMSEmailOther	0
19.	LMS SocialmediaOther	0
20.	SocialmediaEmailOther	0
21.	LMS SocialmediaEmailOther	0
22.	NA	78

Name: Q36
Missing: 0 (0%)　　　Distinct: 9　　　　　　　　Type: Nominal

No.	Label	Count
1.	LMS	56
2.	Socialmedia	58
3.	Email	243
4.	Other	4
5.	LMS Socialmedia	0
6.	LMSEmail	0
7.	LMSOther	0
8.	SocialmediaLMS	0
9.	SocialmediaEmail	0
10.	SocialmediaOther	1
11.	EmailLMS	0
12.	Email Socialmedia	3
13.	EmailOther	1

No.		Label	Count
14.	OtherLMS	0	
15.	Other Socialmedia	0	
16.	OtherEmail	0	
17.	LMS SocialmediaEmail	0	
18.	LMSEmailOther	0	
19.	LMS SocialmediaOther	0	
20.	SocialmediaEmailOther	0	
21.	LMS SocialmediaEmailOther	4	
22.	NA	81	

Name: Q37
Missing: 0 (0%)   Distinct: 8   Type: Nominal

No.	Label	Count
1.	LMS	88
2.	Socialmedia	19
3.	Email	214
4.	Other	38
5.	LMS Socialmedia	0
6.	LMSEmail	2
7.	LMSOther	1
8.	SocialmediaLMS	0
9.	SocialmediaEmail	0
10.	SocialmediaOther	0
11.	EmailLMS	0
12.	Email Socialmedia	0
13.	EmailOther	5

14.	OtherLMS	0
15.	Other Socialmedia	0
16.	OtherEmail	0
17.	LMS SocialmediaEmail	0
18.	LMSEmailOther	0
19.	LMS SocialmediaOther	0
20.	SocialmediaEmailOther	0
21.	LMS SocialmediaEmailOther	0
22.	NA	84