

# Learning Management Systems and E-Learning within Cyprus Universities

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## Abstract

This paper presents an extensive research study and results on the use of existing open-source Learning Management Systems, or LMS within the public and private universities of Cyprus. The most significant objective of this research is the identification of the different types of E-Learning, i.e. Computer-Based Training (CBT), Technology-Based Learning (TBL), and Web-Based Training (WBT) within Cyprus universities. The paper identifies the benefits and limitations of the main learning approaches used in higher educational institutions, i.e. synchronous and asynchronous learning, investigates the open-source LMS used in the Cypriot universities and compares their features with regards to students' preferences for a collaborative E-Learning environment. The required data for this research study were collected from undergraduate and graduate students, alumni, faculty members, and IT professionals who currently work and/or study at the public and private universities of Cyprus.

The most noteworthy recommendation of this study is the clear indication that most of the undergraduate students that extensively use the specific E-Learning platform of their university do not have a clear picture of the differences between an LMS and a VLE. This gap has to be gradually diminished in order to make optimum use of the different features offered by the specific E-Learning platform.

**Keywords:** E-Learning, Learning Management Systems (LMS), Virtual Learning Environment (VLE), Open-Source LMS, Cyprus Universities

## 1. Introduction

Over the past 15 years, knowledge and information about the utilization of various E-Learning services in Cyprus higher educational institutions is incomplete and limited mainly because there is still insufficient information on the key players offering E-Learning services in Cyprus (Stylianou and Kokkinaki, 2006). Moreover, the E-Learning services which are currently offered have to be systematically categorized and any future potentials of using other open-source learning management systems need to be identified. Therefore, the importance of this research becomes more evident by taking into consideration the fact that there is still very limited and in some cases no relevant information about the perceptions of Cypriots towards the use of E-Learning services within the public and private universities of the island. This research intends

to add more information about the learning management systems and E-Learning within Cyprus universities.

## 2. Literature Review

E-Learning is defined as encompassing both learning through the use of ICT (Information and Communication Technology) and learning the necessary competences to make use of ICT in the knowledge society (Christodoulou, Germanakos, and Samaras, 2008). E-Learning can be classified into three main categories which are Computer-Based Training (CBT), Technology-Based Learning (TBL), and Web-Based Training (WBT). CBT is a form of education in which the students learn by executing specific training programs on their computers. TBL constitutes learning via electronic technology including the Internet, intranets, audio/video conferencing, satellite broadcasts, chat rooms, and webcasts (Koller,

2001). On the other hand, WBT uses streaming media to create a dynamic learning environment via the Internet. It is an optimal way to deliver E-Learning content to a large group of people scattered around the world provided that there are high-speed Internet connections.

### 2.1 Synchronous and Asynchronous E-Learning

Synchronous E-Learning has the potential to support E-Learners in the development of learning communities as it is commonly supported by media such as audio/video conferencing, Instant Messaging (IM), and chat. On the other hand, asynchronous E-Learning supports work relations among learners and teachers even when the participants cannot be online simultaneously. In simpler terms, asynchronous E-Learning enables the learners to log on to an E-Learning environment at any time in order to download documents, upload projects and assignments, or send messages to teachers and/or peer students. Asynchronous E-Learning is supported by media such as E-mail, blogs, and discussion boards (Hrastinski, 2008). Synchronous E-Learning makes the learners to become more committed and motivated because a quick response from the teacher and/or other peers is expected. It is mainly

used for discussing less complicated issues and task-planning communications. Moreover, Kock's media naturalness hypothesis predicts that synchronous communication increases psychological arousal (Kock, 2005).

### 2.2 Learning Management System Fundamentals

A Learning Management System or LMS is a web-based software application that is used to centralize and automate the administration of the E-Learning activities such as managing, tracking, and reporting on training events (Ellis, 2009). The types of learning delivered could be online, traditional with ICT elements, and hybrid (a combination of traditional and online learning). It also helps to deliver the learning contents rapidly, configure and personalize learning contents, and enable knowledge re-use. The main functional characteristics of a learning management system include administration tools, content accessibility, content development, content integration, skills management, assessment capabilities, reporting, standards adherence, and security (Ellis, 2009). Figure 1 illustrates the learning management system with its typical functionalities.

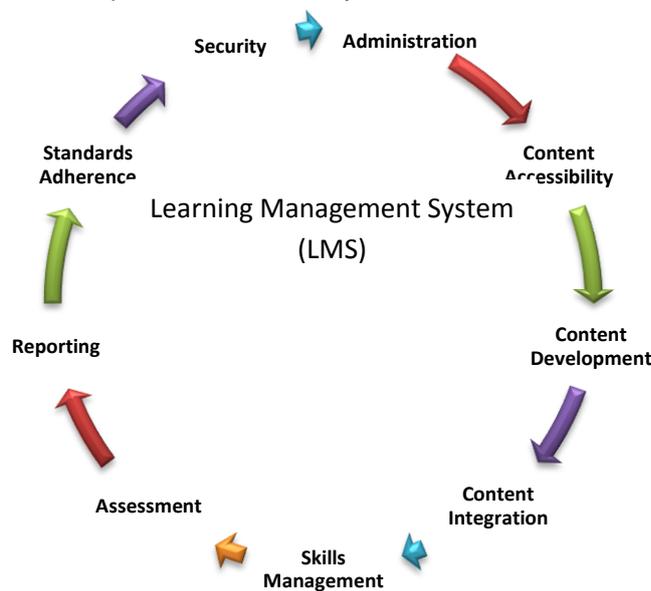


Figure 1: A Typical LMS and its Functional Elements

An effective LMS should enable administrators to manage user registrations and profiles, set curricula, define roles, manage content, author courses, and administer the user payments. Content accessibility involves the medium in

which the content is delivered, i.e. online or in-class as well as the methods and languages of the delivered content. The delivery methods can either be instructor-led, self-paced, or blended (a combination of instructor-led and

self-paced methods). Content development includes authoring, maintaining, and storing the learning content (Trakakis, 2011). Content integration provides native support to a wide range of external systems such as Content Management Systems (CMS), portals, and registration modules. Skills management revolves around assessing the competency skills of the E-Learners using peer reviews and other feedback tools. Assessment capabilities are based on the evaluation and testing of the delivered learning content to the E-Learners. In simpler terms, a learning management system collects, tracks, and stores the assessment data since it has the capability of assessment creation.

One of the most significant functions of a learning management system is the strong and flexible reporting structure which quantifies and evaluates the performance of the specific LMS. In other words, the embedded reporting structure consolidates and tracks all the learning and training efforts within the LMS and creates customized reports based on the courses offered, course completion/incompletion status, etc. Moreover, a learning management system should attempt in supporting standards such as SCORM. SCORM or Shareable Content Object Reference Model is a set of specifications applied to the course contents in order to produce small and re-usable learning objects. It implies that the LMS can import and manage courseware that complies with standards irrespective of the authoring system that has produced the content. In other words, SCORM-compliant course elements can easily be integrated with other compatible elements which result in having a highly modular E-Learning repository. Finally, a priority in any data system containing personal user information and proprietary content is security in terms of user authorization, authentication, and data protection. Passwords and encryption methods are typical security features of an effective LMS (Ellis, 2009).

### *2.3 Learning Management Systems in Cyprus Universities*

The universities in Cyprus can be placed in two categories of public and private. The public universities of Cyprus are the University of Cyprus (UCY), Cyprus University of Technology (CUT), and the Open University of Cyprus (OUC). The private universities of Cyprus are the University of Nicosia (UNic), European University of Cyprus (EUC), the Frederick University, and the Neapolis University of Paphos (NUP). All of the

mentioned universities make use of the E-Learning platforms on the basis of their students' and faculty members' essential learning needs. For instance, Moodle is one of the major open-source learning management systems that increase its share in the educational market. It is widely used within Cyprus universities particularly in the UCY, EUC, the Frederick University, and the NUP. On the other hand, UNic makes use of the Learning Activity Management System (LAMS) which is a new tool for designing, managing, and delivering collaborative E-Learning activities. The CUT and the OUC make significant use of the customized open-source LMS called eCourse and eClass, respectively which are both based on the Moodle infrastructure.

### *2.4 Virtual Learning Environment Fundamentals*

A Virtual Learning Environment or VLE is a set of teaching and learning tools specifically designed to enhance students' learning experience by incorporating computers as well as the Internet in the learning process (Jeba Kumar and Govindaraju, 2009). Ideally, a VLE should have a collection of learning tools for synchronous/asynchronous communication, assessment, student progress monitoring and reporting, collaboration, conferencing, content authoring, as well as personal productivity tools in order to completely satisfy the E-Learners' educational needs. Nowadays the VLEs are mainly used to complement the traditional learning and traditional learning with ICT elements, commonly known as hybrid (blended) learning. A typical VLE consists of these elements: administrative information, course syllabus and details, notice board, student registration, teaching material, reading material and links to digital libraries across the Internet, self-assessment quizzes and tests, communication and collaboration, and simplified content authoring tools.

Over the past 10 years universities and higher academic institutions including the universities in Cyprus have rapidly adopted VLEs due to the several benefits that they offer such as cutting down the time spent for training the users especially if they belong to the administration or research departments. Moreover, VLEs simplify the integration of traditional and distance learning because most of them are SCORM-compliant and the process of uploading, launching, and monitoring courses is standardized. The VLEs currently available in the E-Learning industry are either commercial or open-source. The

open-source VLE enables the users to have free access to their desired virtual learning software such as Atutor, Chamilo, Claroline, Docebo, Dokeos, ILIAS, Moodle and OLAT. It should be taken into consideration that some of the free open-source VLEs are also viewed as a learning management system (LMS) such as Moodle, Claroline, and Dokeos. On the other hand, there are some other learning platforms which are considered as an LMS

only such as LAMS. Similarly, there are learning platforms which are solely considered as a VLE such as Blackboard which is a family of virtual learning software, WebCT which is a subset of Blackboard and it is used to enhance teaching/learning activities within a VLE. Table 1 summarizes the supported features and/or services of the most well-known VLEs available in the E-Learning market.

Table 1: Top Virtual Learning Environments

	<b>Atutor</b>	<b>Chamilo</b>	<b>Claroline</b>	<b>Docebo</b>	<b>Dokeos</b>	<b>ILIAS</b>	<b>Moodle</b>	<b>OLAT</b>
Version	2.0.2	1.8.7.1&2.0	1.10.4	4.0.4	2.0 Pro	4.1.6	2.0.3 & 1.9.12	7.0
Origin Country	Canada	France	Belgium	Italy	France	Germany	Australia	Switzerland
SCORM /AICC Compliance	√	√	√	√	√	√	√	√
Accessibility	√	√						
Assignments	√	√	√	√	√		√	
Audio/Video Conferencing		√	√		√		√	√
Authentication	√	√	√	√	√	√	√	√
Blogging	√			√	√		√	√
Calendar		√	√	√	√	√	√	√
Chat/IM	√	√	√		√	√	√	√
Content Authoring	√	√	√	√	√	√	√	√
Course Catalog				√			√	
Course Management	√	√	√	√	√	√	√	√
Discussion Forums	√	√	√	√	√	√	√	√
Document Management			√		√		√	√
E-mail	√	√	√	√	√	√	√	√
File Sharing	√	√	√			√	√	√
Glossary	√	√	√		√	√	√	
Internal/Web Search	√	√	√	√	√	√	√	√
Learning Paths			√		√		√	√
Mindmapping					√			

Multi-Language	√	√	√	√	√	√	√	√
News & Announcements	√	√	√	√	√	√	√	√
Newsletter	√		√		√	√		√
Pod/Webcasting					√	√	√	√
Quiz Tools	√	√	√	√	√	√	√	
Reporting			√		√		√	
RSS Feed	√		√			√	√	√
Social Networking	√	√	√	√	√		√	√
Statistics	√		√				√	√
Surveys	√	√	√			√	√	√
Test/Exam Tools	√	√	√	√	√	√	√	√
Wiki Tools	√	√	√	√	√	√	√	√
Web Browser (IE,GoogleChrome, Firefox,Opera,Safari)	IE, Google Chrome	All	All	IE, Google Chrome, Firefox, Safari	All	All	All	Firefox

### 2.5 E-Learning Features and Services

Computers and Internet technologies continue to be more integrated within the professional life of academics and IT experts mainly because the instructional designers have access to a wide range of new flexible and scalable technologies. Therefore, these technologies open gateways for a multitude of different online courses, webinars, discussion forums, and other E-Learning services. Students or the E-Learners use several technology resources for their online course such as VLEs with features that support synchronous/asynchronous communications, web collaboration, content authoring/presentation, and personal productivity tools.

Concurrent and distributed systems use two types of communication methods to exchange information: synchronous and asynchronous. When sending and receiving information between a sender and a receiver are simultaneous events, then the communication is 'synchronous'. On the other hand, when sending and receiving information between a sender and a receiver do not essentially occur

at the same time instant, then the communication is 'asynchronous' (Cacciagrano and Corradini, 2006).

The web collaboration focuses on how the shared virtual workspace technologies and the web conferencing provide structured synchronous and asynchronous collaboration instead of physical face-to-face meetings. They simply achieve this goal by enabling the audio-visual interactions across the Internet and shared electronic workspace particularly for developing documents such as surveys and application sharing. Some of the most well-known web collaboration tools are blogging, wiki, RSS feed, surveys, social bookmarking, file/application sharing, collaborative whiteboards, collaborative research, and collaborative mindmapping tools. Collaborative mindmapping or concept-mapping is used to create diagrams of the relationship(s) between various concepts, ideas, or other pieces of information; the collaborative mindmapping technique can improve learning and study efficiency in an online learning environment up to 15% as compared with the conventional note-taking (Farrand, Hussain, and Hennessy, 2002).Content authoring is used to prepare

information in order to be presentable and accessible to individuals and groups in all types of learning environments. There are many tasks involved in content authoring such as content manipulation, distribution, and presentation (Sharma and Meenakshi, 2005). The ultimate goal of content authoring is providing an integrated system that will satisfy the concept of “author once, publish to many platforms”.

The personal productivity tools within a learning environment are mainly used for an individual learner’s personal working and learning purposes. Table 2 summarizes some of the top synchronous/asynchronous communication, web collaboration, content authoring/presentation, and personal productivity tools which have been derived from the Center for Learning and Performance Technologies for 2011.

Table 2: Top Features and Examples of an E-Learning Platform

<b>Feature/Tool</b>	<b>Example</b>
<b>Synchronous Communication</b>	
Audio/Video Conferencing	Skype
Web Conferencing	Elluminate/Wimba, Adobe Connect
Chat Rooms	ooVoo, Yahoo Messenger
IM	Skype, Google Talk, Windows Live Messenger
Voice Groups	Voxopop, TalkShoe
<b>Asynchronous Communication</b>	
E-mail	Gmail, Microsoft Outlook
Newsletter	eNewsletter Manager
SMS/Text Messaging	GroupMe, SMSBlaster
Discussion Forums	QuickTopic, Shareflow
<b>Web Collaboration</b>	
Blogging/Wiki	Blogger, Wordpress, Wikispaces, Google Sites
RSS Feed	Google Reader, RSS Feed Reader
Surveys	Google Docs, SurveyMonkey
Social Bookmarking	Delicious
File/Application Sharing	Dropbox, Livebinders
Collaborative White-Boards	Scriblink, GroupBoard
Collaborative Research	Wikipedia, Diigo
Collaborative Mindmapping	Freemind, Mindomo
<b>Content Authoring/Presentation</b>	
Content Authoring	Adobe Captivate, Adobe Flash, eXe
Testing/Quizzing	ClassMarker, Quiz Revolution
Presentation Creation/Hosting	Microsoft PowerPoint, Prezi, Google Docs, Slideshare
Spreadsheets	Edit Grid, Google Docs, OpenOffice
<b>Personal Productivity</b>	
Personal Organizers	Evernote, OneNote
Calendars/Event Schedulers	Google Calendar, Doodle

Calculators	Screen Calculator
Spell Checkers	Spellify, SpellJax
Search Engines	Google Search, Bing
Research Tools	Google Scholar, Zotero
Social Networks/Collaboration Platforms	Facebook, LinkedIn, Twitter

### 3. Research Methodology

The quantitative research is the selected research type for conducting the study on learning management systems and E-Learning within Cyprus universities. This clearly implies that empirical data were collected using online questionnaires from all the public and private universities in Cyprus which indicated a relatively large sample. The respondents were asked a set of structured questions and their responses were tabulated. The collected data were then modeled and analyzed using statistical methods and finally the derived results were carefully evaluated. Software packages such as SPSS<sup>[1]</sup> (Statistical Package for Social Sciences) were typically used for this purpose. The required data for this research study were gathered from the undergraduate/graduate students, alumni, faculty members, and IT professionals who currently work and/or study at the public and private universities of Cyprus using an online questionnaire in Google Docs<sup>[2]</sup>.

#### 3.1 Sampling Technique

The general population for this study contains all the general practitioners, i.e. students (undergraduate, graduate, and alumni) as well as the faculty members and the IT/ICT professionals of the public and private universities of Cyprus. The respondents were asked to express their views regarding the current E-Learning practices in Cyprus as well as their personal perceptions and preferences towards E-Learning services and/or features available in the mentioned universities. Since the size of the population for this study was not clearly known, random sampling technique was used so that every individual in the population of interest, i.e. the students, faculty members, and IT/ICT professionals of all the Cypriot universities have an equal chance of being selected for the specific sample. It

<sup>[1]</sup> SPSS can be downloaded from:

<http://www.spss.com>

<sup>[2]</sup> Google Docs can be accessed from:

<http://docs.google.com>.

should be noted that as the population size increases, the percentage of people needed to achieve a high level of accuracy decreases. In order to determine the correct sample size for this study, the exact size of the population, the desired error level, and the desired confidence level have to be known. The target population size was estimated to be 1,000 people even though the overall academic population of all the Cypriot universities is more than 1,000. This study aims for an error level (confidence interval) of 5% and a confidence level of 95%. The error level indicates that there will be an error margin of plus or minus 5% in the derived results. The confidence level of 95% shows how confident the researcher is towards the error level. With these inputs, the appropriate sample size for this research study is 278 which mean that if the online questionnaire is sent to 1,000 people within the mentioned universities, then at least 278 people have to complete the questionnaire in order to maintain the 95% confidence level and the 5% error margin.

### 4. Research Analysis

The descriptive statistics especially the frequencies analysis is one of the first analysis methods used to check the validity of the data and if there are any errors in the collected data. Table 2 illustrates the frequencies analysis performed on the following variables:

- Current academic position
- Current academic institution

Taking a careful look at Table 3, it turns out that as the frequency increases the values for Percent and Valid Percent also increase. For instance, in the Current Academic Position table the highest frequency belongs to Faculty Member which implies that from the total number of 280 respondents to the online questionnaire, 93 are faculty members. This number corresponds to 33.1%. Moreover, the Cumulative Percent is calculated by adding the value of Valid Percent, i.e. 33.2% to the previous value of Cumulative Percent, i.e. 58.2% which becomes 91.4%; it simply

indicates that 91.4% of the participants in the survey are faculty members.

Table 3: Descriptive Statistics – Frequencies Analysis

Current Academic Position					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Undergraduate Student	82	29.2	29.3	29.3
	Graduate Student	73	26.0	26.1	55.4
	Alumni	8	2.8	2.9	58.2
	Faculty Member	93	33.1	33.2	91.4
	IT Professional / ICT Support	13	4.6	4.6	96.1
	Other	11	3.9	3.9	100.0
	Total	280	99.6	100.0	
	Missing	System	1	.4	
Total		281	100.0		

Current Academic Institution					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	UCY	47	16.7	16.8	16.8
	CUT	2	.7	.7	17.5
	OUC	2	.7	.7	18.2
	UNic	157	55.9	56.1	74.3
	EUC	26	9.3	9.3	83.6
	Frederick	27	9.6	9.6	93.2
	NUP	4	1.4	1.4	94.6
	Other	15	5.3	5.4	100.0
	Total	280	99.6	100.0	
Missing	System	1	.4		
Total		281	100.0		

Similarly, in the Current Academic Institution table the highest frequency belongs to UNic, i.e. 157 which indicates that 55.9% of the participants are from UNic followed by 16.7% which belong to the UCY.

Cross-tabulation is an efficient method to identify the relationship among certain variables. For this reason, a cross-tabulation

test is performed to investigate if there is a relationship between the respondents' current academic position and their level of understanding about different forms of E-Learning, i.e. CBT, TBL, and WBT. The results of the cross-tabulation are shown in Figure 2.

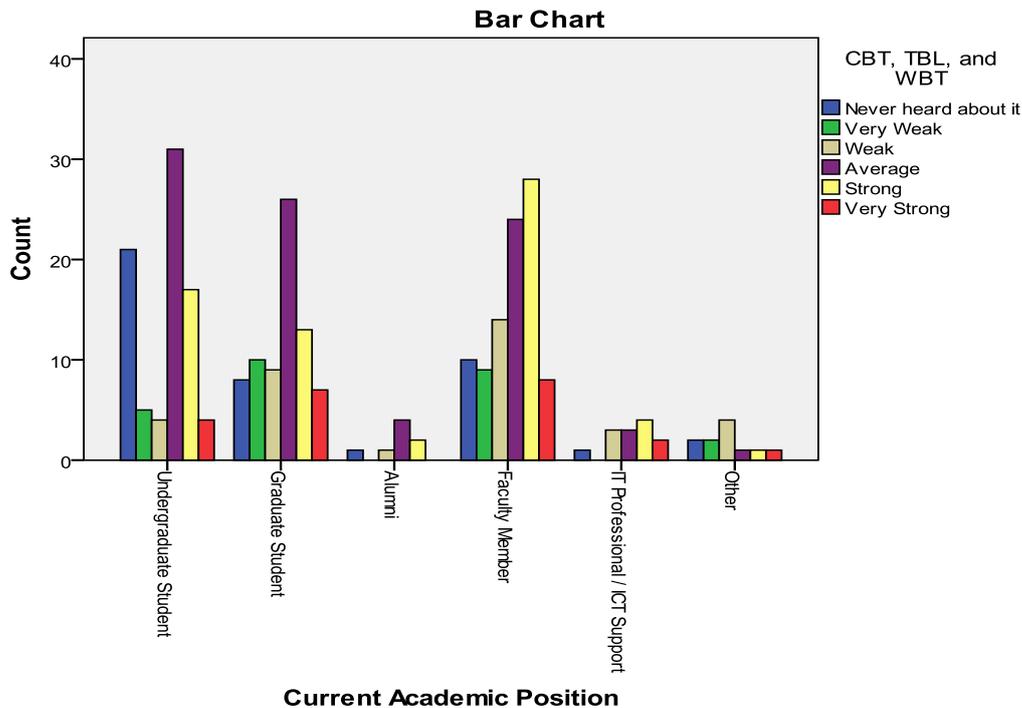


Figure 2: Cross-Tabulation (Academic Position and General E-Learning Understanding)

It turns out that the level of understanding about different forms of E-Learning, i.e. CBT, TBL, and WBT is high (Strong and Very Strong response options) among the faculty members, undergraduate students, and IT professionals mainly because the current undergraduate students incorporate E-Learning into their academic life much more than the graduate students and alumni who studied and graduated a few years ago where E-Learning was not an essential part of their educational life even though there is an average

understanding of E-Learning among them. Furthermore, the cross-tabulation analysis is extensively performed on different variables, mainly the E-Learning features and/or services and their use within people with different academic positions. It turns out that the asynchronous communication tools like E-mail and synchronous communication tools like IM are widely used among the people with different academic positions who have participated in this research. Figure 3 illustrates the findings.

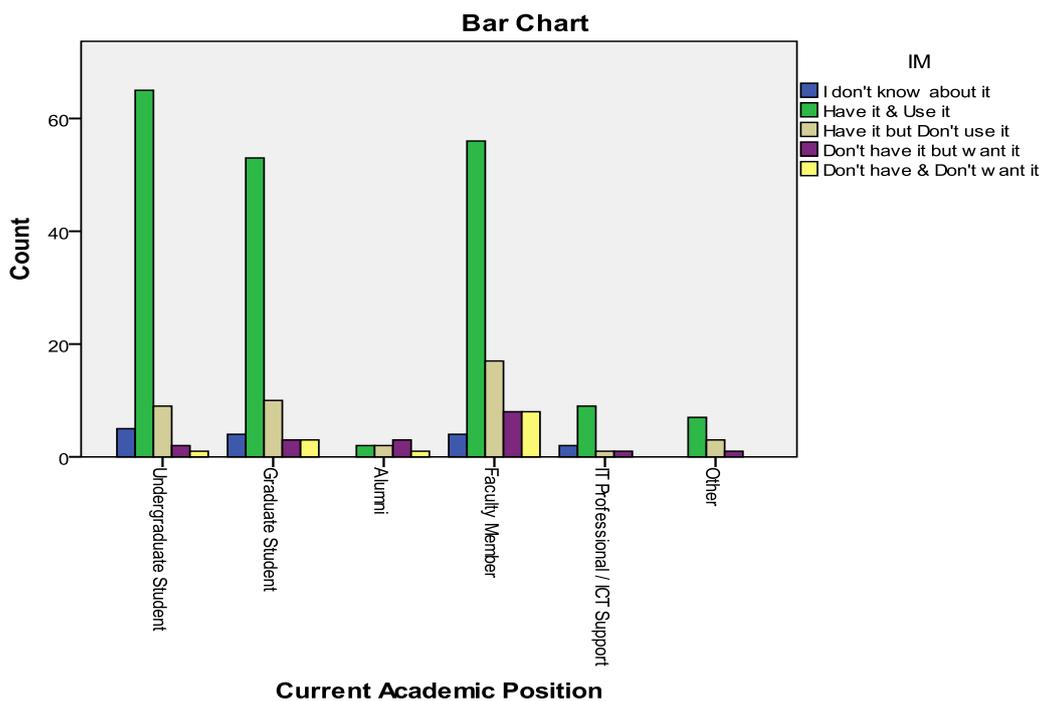
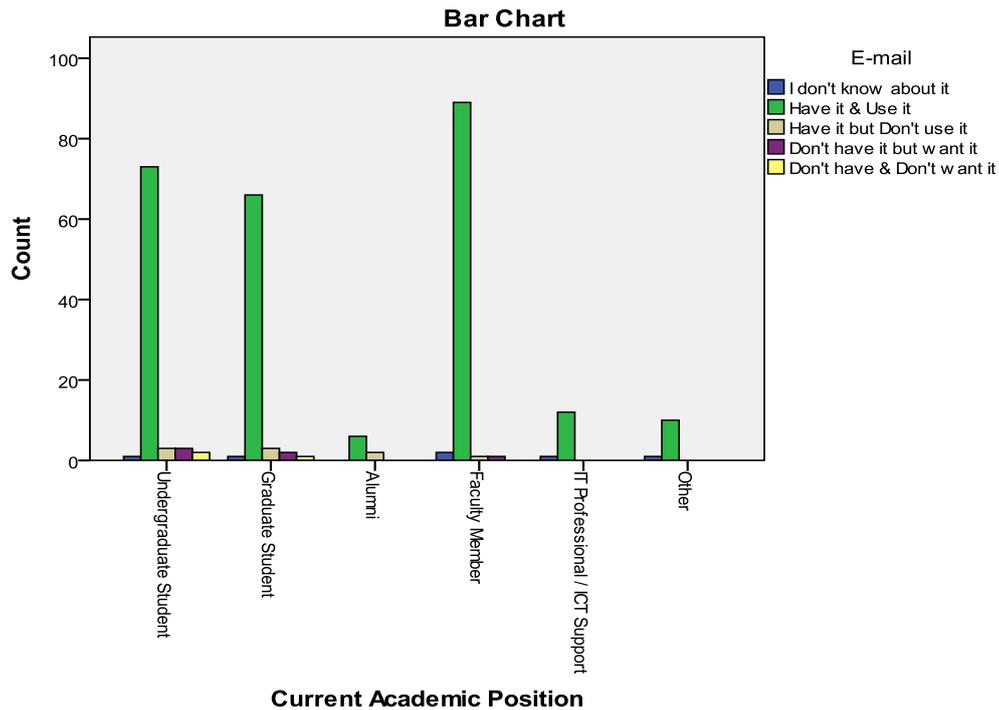


Figure 3: Asynchronous/Synchronous Communication Tools (E-mail and IM)

According to the cross-tabulation results shown in Figure 4, blogging tools are quite often used by the undergraduate/graduate students, the faculty members, and the IT professionals. The wiki tools and the survey tools are considered popular web collaboration tools as they are widely used by all the

participants. The RSS feed tools are also popular among undergraduate students, IT professionals, and to some extent the graduate students; however, there is less knowledge about the RSS feed tools among the faculty members and alumni who have participated in this research study. According to the results,

social bookmarking is a less investigated web collaboration tool by most of the participants mainly because the current E-Learning platforms used within the universities of Cyprus do not have social bookmarking as an embedded feature in the learning platform because some of the currently available E-Learning platforms in Cyprus universities have a feature called 'Glossary' which is sometimes used as a bookmarking service even though social bookmarking and glossary are two different features of an E-Learning platform.

Another significant web collaboration feature is collaborative research by using tools such as Wikipedia which seem to be quite popular among most of the participants in the study. Similar to social bookmarking and collaborative whiteboards, collaborative mindmapping is a new feature embedded in some of the open-source E-Learning platforms such as Dokeos; therefore, it is justifiable that most of the participants in this study have not heard about mindmapping, but they are interested in having this feature added into their learning platforms.

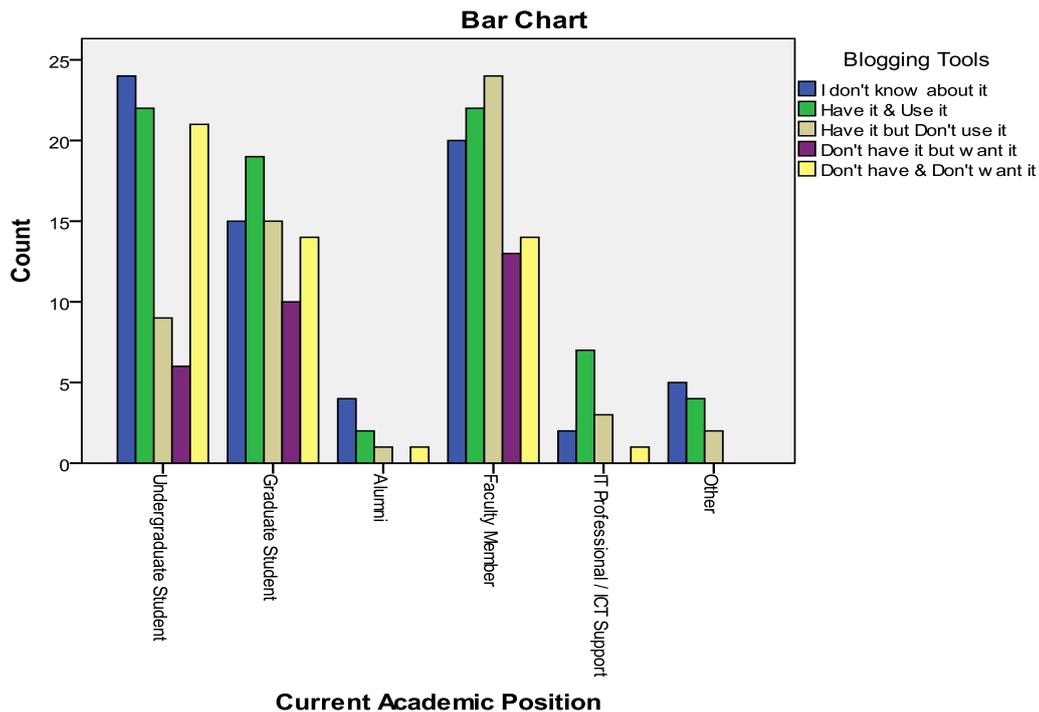


Figure 4: Web Collaboration Tools (Blogging)

One of the important parts of the conducted research was to analyze the utilization of various personal productivity tools by several groups of participants. The personal productivity tools essentially add value to the specific E-Learning platform used by the learners and instructors because they facilitate

and speed up the process of E-Learning due to their 24/7 availability. The most popular personal productivity tools used mainly by the students and faculty members were online calculators, spell checkers, and social networks according to Figure 5.

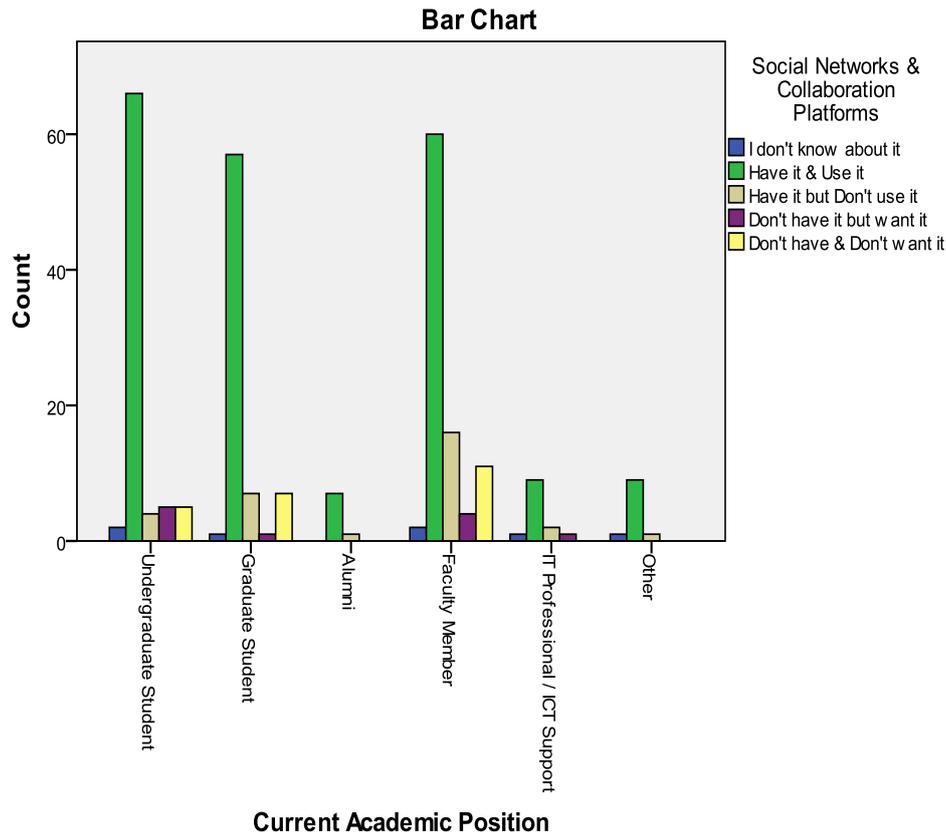


Figure 5: Personal Productivity Tools (Social Networks)

## 5. Research Conclusions and Recommendations

The increased utilization of E-Learning has enhanced the amount of self-directed learning among people because of the continuous improvements in the infrastructure, design, content, and features added to the learning platforms. This has obviously created high competition among several open-source LMS vendors to dominate the E-Learning market. It turned out that adopting E-Learning solutions is beneficial for most businesses because the learning process is self-paced and self-directed, multiple learning styles can be incorporated, geographical barriers are eliminated, accessibility to the learning material is on a 24/7 basis, and the overall study costs are cheaper compared to the traditional learning.

The most noteworthy recommendations of this study based on the analysis of the collected data from the academically-oriented participants are to increase the overall knowledge about E-Learning, especially the

different forms of E-Learning platforms, i.e. LMS and VLE among current students of the Cypriot universities. The derived analysis results clearly indicated that most of the undergraduate students that extensively use the specific E-Learning platform of their university do not have a clear picture of the differences between an LMS and a VLE. This gap has to be gradually diminished in order to make optimum use of the different features offered by the specific E-Learning platform.

## 6. Future Research

The most feasible areas for future research related to this study include an in-depth analysis of the several features of the open-source LMSs other than those currently used within universities in Cyprus as well as the necessary considerations of converting the current E-Learning platforms into M-Learning platforms within the upcoming years, i.e. the next 5 years.

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