

Analysis of Students' E-Content Engagement at the National Egyptian E- Learning University (EELU)

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Introduction

Discussions never stopped about student engagement and its importance to effective teaching and learning. Despite the absence of a universally accepted definition of what constitutes engagement, it has been linked to undergraduate academic achievement, student attrition, student retention, student motivation and institutional success. Clearly defining engagement and identifying its measurable components can assist universities in enhancing their efforts towards improving student engagement. Identifying indicators of student engagement allows universities a degree of measurability that can be used to inform and improve upon existing practices. This is especially true when students are increasingly participating in courses that are predominately delivered online without face-to-face interactions with their teachers and peers (Chen, Gonyea & Kuh, 2008).

In modern education, and specially in technology assisted educational contexts, learning management systems (LMSs) accumulate vast amounts of data on students' behavior, this data can be used to inform and improve online student engagement.

Content engagement has been always one of the key issues in student's learning effectiveness. Moreover, it has been rated by students as one of the quality factors in Education. (Pimpa, 2010, 1)

Engaging content is the foundation of any effective course, either in e-learning context or otherwise. Boring slides and overly long modules can lead to learner disconnect. How you capture and keep learners' attention to content is an essential task that every instructor or facilitator need to think about carefully. (Benz, 2013, 5)

This paper presents the results of a study that examined the level of students' engagement with e-content at the Egyptian E-Learning University (EELU). EELU is the first higher education institution offering educational programs using latest ICT technologies. Established in 2008 to lead the e-learning services industry in Egypt offering flexible opportunities to gain knowledge and skills in several domains such as: Information Technology, Business studies and Education.

Based on the teaching and learning model applied at EELU which is presented later on, the study focused on several indicators to analyze students' engagement with e-content including: System Logs, Assignment Interactions (Views and Uploads), Course Views, Quizzes interactions, SCORM package views, Files and folders views.

The study focused on undergraduate students at the faculty of Computers and Information Technology and the faculty of Business Administration, and postgraduate students at the faculty of Educational Studies (Diploma and master's levels) and the faculty of Computers and Information Technology (Masters level).

The study depended on reports generated by the Learning Management System (Moodle) to analyze the students' e-content engagement indicators. These indicators reflect the strengths and weaknesses of the content design and delivery strategies. The results of this analysis guided the developments of teaching learning strategies aiming to improve the effectiveness and academic achievements

through encouraging greater content engagement, taking into consideration the different learning styles for students and their preferences of learning.

Importance of the Study:

Engagement with e-content is one of the key indicators of e-learning system effectiveness and efficiency. This study aimed at breaking down and analyzing e-content engagement indicators of students enrolled in undergraduate and postgraduate programs at the Egyptian E-Learning University (EELU).

The available relevant literature and the new collected and analyzed data throughout this study, which mainly are related to the level of details, are addressed in terms of engagement types using several teaching and learning activities and resources.

This data addressed e-content engagement indicators of students from different specialties and multiple study levels, giving a wider picture of differences, patterns, and behaviors of students from different perspectives.

It is also important to mention that, understanding the dynamics of students' e-content will significantly help in developing better teaching and learning strategies and methods, which could enhance the overall experience of online learning.

Objectives of the Study:

This study aimed at:

- Comparing e-content engagement indicators among students of different specialties and study levels.
- Developing the understanding of students' e-content engagement behaviors, patterns, and differences.
- Laying a solid ground towards developing informed teaching and learning strategies and methods at the Egyptian E-Learning University

Statement of Study Problem:

This study aims at analyzing EELU students' e-content engagement through collecting and studying data in relation to students; online behavior and interactions with online content and activities offered through EELU LMS. The main motive for this study is an argument aroused among university academic staff that postgraduate students are more engaged with e-content compared to undergraduate students.

Hence, the problem of the current research, which could be formulated as there is a need to evaluate the behavior of students of the EELU and their interactions with the electronic content provided through the University's learning management system LMS.

Therefore, this study was carried out to analyze students' behaviors and interactions across different levels, specialties, and degrees (Undergraduate and postgraduate).

Study limitations:

The study focused mainly on analyzing data collected through EELU LMS in relation to students' engagements with specific activities including: System Logs, Assignment Interactions (Views and Uploads), Course Views, Quizzes interactions, SCORM package views, Files and folders views.

Other activities such as attending virtual classrooms or video conference lectures were not analyzed, as they could be considered mandatory activities which students are obliged to attend.

Study Questions

This study aimed at answering on main question:

To what extent do EELU students engage with the e-content offered through LMS?

To answer this question, five subsidiary questions should be answered as follows:

1. What are the main key indicators of students' e-content engagement?
2. To what extent does a student engagement differ with Information technology students and Business administration students in undergraduate degrees?
3. To what extent does a student engagement differ in undergraduate and postgraduate degrees?
4. To what extent does a postgraduate student engagement differ in Software Engineering Masters program and e-learning technologies postgraduate program?
5. To what extent does a student engagement differ in different programs at EELU?

Literature Review:

Carver & Todd (2013) in their study identified the student perception of content mastering and engagement through electronic resources (e-content materials), they proved that Students' usage of e-content did not impact their grades.

The qualitative and quantitative data supported the conclusion that using e-content in an online module was an effective method for increasing students' engagement with and mastery of the course content as compared to the previous more static Word format or PDF files.

Carini et al (2006) found that, although in general, the relationship between engagement and performance is complex; engagement ... (i.e. Level of academic challenge, active and collaborative learning, student-faculty interaction, enriching educational experiences, supportive campus environment, reading and writing, quality of relationships, institutional emphases on good practices, higher-order thinking, student-faculty interaction involving coursework, integration of diversity into coursework) is *positively* correlated with students' grades.

Rodgers (2008, 147-148) indicated the level of E-learning engagement by the number of hours logged into learning management system and participation in various activities. He found a positive relationship between the number of hours spent online and student's achievement and grades. The courses covered were Economics, Accounting and Finance.

Douglas & Alemanne (2007) presented data suggesting that some participation levels have predictive value for relative success of students. The combined indicators of: A) participation (email, class utterances and discussion posts) and, B) course click count appear to be valid predictors of exam performance in an e-learning mediated course.

Engagement

Chen, Gonyea & Kuh (2008) stated that engagement is the degree to which learners were engaged with their educational activities and that engagement is positively linked to a host of desired outcomes, including high grades, student satisfaction, and perseverance.

Other studies defined engagement in terms of interest, effort, motivation, time-on-task and suggested that there is a causal relationship between engaged times, that is, the period in which students are completely focused on and participating in the learning task, and academic achievement (Bulger, et al., 2008).

A basic principle of the research of engagement is that students' activity, involvement and effort in their learning tasks are related to their academic achievement, while there was not any single definition for engagement, the following definition represents an aggregation of the literature.

Engagement is seen to comprise active and collaborative learning, participation in challenging

academic activities, formative communication with academic staff, involvement in enriching educational experiences, and feeling legitimated and supported by university learning communities (Coates, 2007).

This definition suggests that engagement is the consolidation of a number of distinct elements including active learning, collaborative learning, participation, communication among teachers and students and students feeling legitimated and supported.

At a fundamental level, these elements are dependent on a range of interactions such as interactions between teachers, students and content. It could be said that the online learning environment facilitates the interactions required for learning and therefore have an influence on student engagement. It could also be said that measuring student participation within a learning environment and contrasting this measure with student results can provide an approximation of student engagement.

LMSs allow for every mouse click from each student within the system to be recorded. This data may be tracked for analysis and used to gauge a student's level of involvement. Beer et al. (2010) argued that while LMS data has the potential to measure student engagement, research into how this can be done is still in its infancy.

Learning analytics tools

The study of Atif, et al., (2013, 70-71) suggested that Learning Analytics could be carried out using the following data sources:

- **Input (s):** (Student information system (SIS) - Learning/course management system - Grade book - Discussion forums - Social media pages - University specific systems)
- **Stakeholder(s):** (Institution – Department – Learner)

- **Goal(s):** (Monitoring – Analysis – Prediction – Intervention – Adaptation - Tutoring/Mentoring – Assessment – Feedback – Personalization – Recommendation – Reflection)
- **Technique(s) used:** (Learning analytics (LA) - Social network analysis (SNA) – Visualization – Statistics - Emotional intelligence (EI))
- The Study of Dyckhoff et al., (2012, 61-62) determined the requirement of Learning analytics tools as the following:
- **Usability:** prepare an understandable user interface (UI), appropriate methods for data visualization, and guide the user through the analytics process.
- **Usefulness:** provide relevant, meaningful indicators that help teachers to gain insight in the learning behavior of their students and support them in reflecting on their teaching.
- **Interoperability:** ensure compatibility for any kind of VLE by allowing for integration of different data sources.
- **Extensibility:** allow for incremental extension of analytics functionality after the system has been deployed without rewriting code.
- **Reusability:** target for a building-block approach to make sure that re-using simpler ones can implement more complex functions.
- **Real-time operation:** make sure that the toolkit can return answers within microseconds to allow for an exploratory user experience.
- **Data Privacy:** preserve confidential user information and protect the identities of the users at all times.

This study used learning management system (Moodle) reports such as students' logs, assignments interactions, course views, Quizzes, SCORM package views, and files

views and downloads to analyze students' engagement indicators.

E-Content:

The term E-Content stands on a line with a large number of other terms that are being used in connection with new media without having a clear understanding what actually is meant by them. It has become common to add an (E-) to all kinds of fields: Government becomes E-Government, Democracy becomes E-Democracy, Business becomes E-Business, and so on.

Often it remains unclear, however, what exactly constitutes the difference between an activity and an E-activity and if there is one at all. Does adding the fashionable prefix (E-) just mean that ICT is involved in some way? But how does that make a difference? It should be clarified what exactly E-Content is supposed to mean and how it is different – if at all – from other kind of content. (Bruck, P., Buchholz, A., Karessen, Z., & Zerfass, A., 2005, 4-5)

E-Contents should essentially be didactic in nature. The term "didactic" refers to contents such as self-instructional material, audio and video that convey some moral, fact or learning. In virtual education, the self-instructional materials are essentially didactic in nature. The philosophy behind this is that self-instructional materials try to bridge the gap between the teacher and the taught. The philosophy stands good for the e-content generation too. (Eremias & Subash, 2013, 45)

Teaching and Learning at the Egyptian E-Learning University (EELU)

The educational model applied at EELU aims to achieve a strategic objective that is providing accessible, flexible higher education and lifelong learning opportunities.

Educational activities at EELU are communicated distantly via the Internet, along with that, the structure and features of educational processes within EELU allow learners to literally practice learning activities anywhere and anytime. The educational resources are accessible/available via the Internet 24/7 providing higher education opportunities for marginalized groups such as women, education dropouts and rural/remote areas residents to seek knowledge and capacity building at their own pace.

The educational model at EELU puts the learner at the center of the learning process, giving him/her a lot of control over his/her learning and activities. This is done through the provision of multiple educational resources that allow the learner to practice self-learning. This degree of freedom and control empowers learners to read, interact, collaborate, evaluate, synthesis... etc., and become innovators

Adding to this the fact that this type of learning is mainly exploratory and engaging. Students seek knowledge and search for its resources, and throughout this journey, s/he will acquire lots of experiences and knowledge. This methodology of learning promotes collaboration between students in joint activities, throughout these activities, students mutually exchange knowledge and experiences.

The Teaching and Learning Processes and services at EELU could be categorized as follows:

- **Teaching and learning services**

This category includes all delivery tools that are used to communicate content, interactions, activities and other forms of learning experiences between students/instructor and students/students. These are Learning management system, e-courses, video conferencing network, virtual classroom system, document/ video on-demand library, E-assessment system.

EELU video on-demand service for students to watch streaming video of previous lectures or review assignment sessions 24/7. Students can replay an entire lecture or view only the portions of the lecture they would like to see based on the results of a keyword search.

Virtual classrooms are used to perform activities where all course participants and staff members are connected at the same time. EELU use two of the most advanced Virtual classroom systems to deliver virtual sessions. Virtual classrooms allow staff work with students in a shared PowerPoint presentation, whiteboard and perform instant messaging with students. These types of classes require simultaneous participation of students and the activities must be planned in advance.

EELU blended courses are delivered using the (Moodle) web-based learning platform, for the course materials, a typical e-course content, contains text, artwork and interactive tools that play together to explain concepts and offer learning guidelines. Video, narration, text, graphics, and animation can enhance the learning outcomes and increase students' understanding. It may involve human interaction through the role of online simulations and exercises. This will enable students to try to see and practice, thus increasing retention rate. Students also have the choice to repeat and go over and over their course material, which enables them to obtain better retention.

Various forms of quizzes and assessments take place throughout the blended learning model adopted at EELU. Also, self-assessment and feedback, both reinforce learning and help to support student motivation.

E-Assessment is the use of technology to manage and deliver assessment. This assessment itself could be diagnostic, formative, or summative. EELU applied the most widely used forms of e-assessment such as: e-

assignment, online tests, and quizzes. EELU uses both Question Mark and Moodle quiz tool for formative and summative assessment, including examinations. Also, Moodle assignments allow staff members to set a task requiring students to prepare digital content in any format and submit it online for grading.

- **Student Support services**

This category includes operational services essential for the learning process such as online registration, e-mailing system, Internet access, electronic grade book and other related services.

EELU portal provides logged-on access to a range of services for students. With student e-services, such as: view personal details, enrolment details, request a transcript of results, view notifications and calendar information such as lecture schedule and final examinations.

All Faculty, staff and students enrolled in the EELU have an e-mail address that ends in @eelu.edu.eg. Students' email accounts are generated for all students upon registration completion. Through this email address, they can receive and send all the news of the EELU community. Furthermore, the e-Learning platform which is built specifically for EELU have a "student forum", where students may discuss among themselves course related issues such as, assignments and grades.

The purpose of activating a student email account is to allow students to conduct collaborative work efforts and share information with other fellow students and faculty members regardless of time and/or geographic boundaries.

Methodology:

This study follows a descriptive approach through collecting and analyzing data related to students' online activities within courses delivered through Learning

Management System (Moodle) during the academic semester of Spring 2016/2017.

The data collected covered 19 courses offered through 4 academic programs (2 undergraduate – 2 postgraduate). A breakdown of students' distribution is shown in the following table.

Table (1) Number of enrolled students in sample courses.

Level	Course Name	No. of Students
Computers and Information Technology Program		
1 st IT	Introduction to Web Technology	106
1 st IT	Probability and Statistics	98
2 nd IT	Computer Organization (1)	114
2 nd IT	Operating Systems	109
3 rd IT	Intelligent Databases	151
3 rd IT	Neural Networks	182
4 th IT	Integrated Information Systems	142
4 th IT	Web Engineering (3)	135
Total		1037
Business Administration Program		
1 st Bus	Accounting Principles (2)	113
1 st Bus	Mathematics for Business	142
2 nd Bus	Introduction to Finance	153
2 nd Bus	Production and Operations Management	92
3 rd Bus	E- Business	78
3 rd Bus	Managerial Economics	85
4 th Bus	E-marketing	25
4 th Bus	Auditing (1)	57
Total		745
Educational Studies Program		
Diploma in Education	E-learning Fundamentals and Principles	12
Master of Education	Authoring and Programming Tools for E-Learning Systems	9
Total		21
Master of Software Engineering Program		
Master of Software Engineering	Software Construction	9

The table indicates the number of students enrolled in courses covered by the study, the computers and information technology program were represented by (8 courses in the 4 levels) with a total number of (1037) students (57.2%). Business administration program was represented by (8 courses in the 4 grades) with a total number of (745) students (41.1%), educational studies program with (2 courses in diploma and masters levels) with a total number of (21) students (1.15%), Masters of Software Engineering program (1 course) with a total number of (9) students (0.5%).

Collected Data:

Based on the teaching and learning model and activities applied at EELU, and due to the fact that students' activities and participation in the online learning context is mainly recorded through database logs, the only objective method to observe and understand their behaviors was to collect the LMS logs and records. These records will give a quantitative indication of how they interact with e-content materials, instructors and their peers.

The study depended on recorded reports generated by Moodle LMS which included information about the following:

- System Logs
- Assignment Interactions (Views and Uploads)
- Course Views
- Quizzes interactions
- SCORM package views
- Files and folders views and statistics

Data Analysis:

The study applied frequency analysis methodology to identify the nature of students' engagement through interaction indicators. The results are presented as follows.

➤ **System Logs:**

Logs refer to the tracking records of students' behaviors across all pages in MOODLE LMS, meaning that any action or behavior will be recorded in logs.

Table (2)
Students' logs distributed among courses covered

level	Course	No. of Students per course	Logs records	Average logs per student
1 st IT	Introduction to Web Technology	106	11156	105.2
1 st IT	Probability and Statistics	98	12607	128.6
2 nd IT	Computer Organization (1)	114	16405	143.9
2 nd IT	Operating Systems	109	22856	209.7
3 rd IT	Intelligent Databases	151	22889	151.6
3 rd IT	Neural Networks	182	24028	132.0
4 th IT	Integrated Information Systems	142	19904	140.2
4 th IT	Web Engineering (3)	135	19556	144.9
1 st Bus	Accounting Principles (2)	113	10734	95.0
1 st Bus	Mathematics for Business	142	13030	91.8
2 nd Bus	Introduction to Finance	153	18011	117.7
2 nd Bus	Production and Operations Management	92	12764	138.7
3 rd Bus	E- Business	78	9321	119.5
3 rd Bus	Managerial Economics	85	13026	153.2
4 th Bus	E-marketing	25	3439	137.6
4 th Bus	Auditing (1)	57	7185	126.1
Master of Education	Authoring and Programming Tools for E-Learning Systems	12	4317	359.8
Diploma in Education	E-learning Fundamentals and Principles	9	3287	365.2
Master of Software Engineering	Software Construction	9	4639	515.4

Table (2) indicates that “Neural Networks” is the highest Number of Logs, which reached (24028), The Neural Networks means learning by examples and drawing a brain net to infer the rules and principles. From the highest logs of the students, it can be understood that

students prefer to learn by the deductive method and this refers to the direct interaction between the students and the material which is provided by LMS (Moodle). The Lowest Number of Logs for “E-learning Fundamentals and Principles” which reached (3287) referring to the lowest desire of the students to read pure information without using their mind to deduct or induct information like Neural Network and Figure (1) shows that.

Figure (1): Students' Courses Logs records

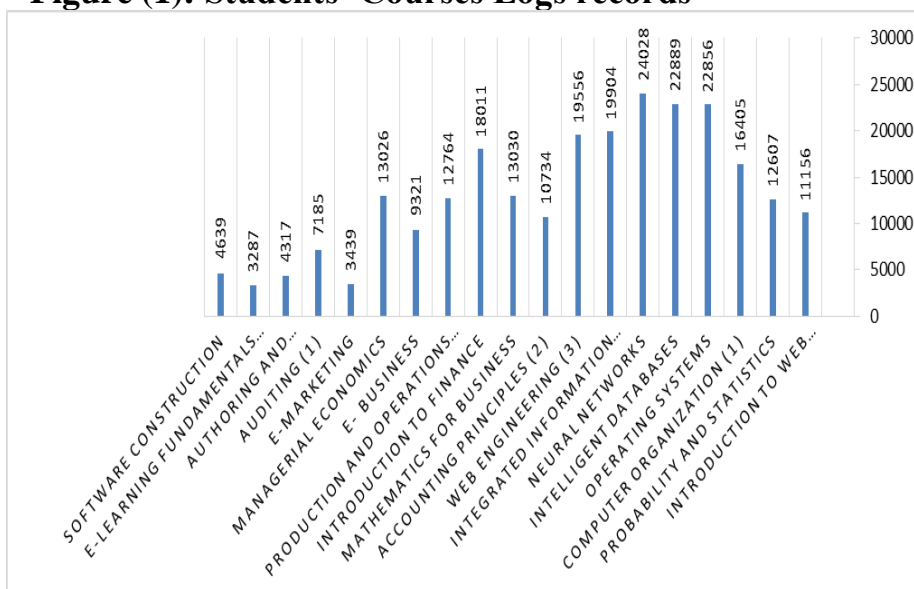
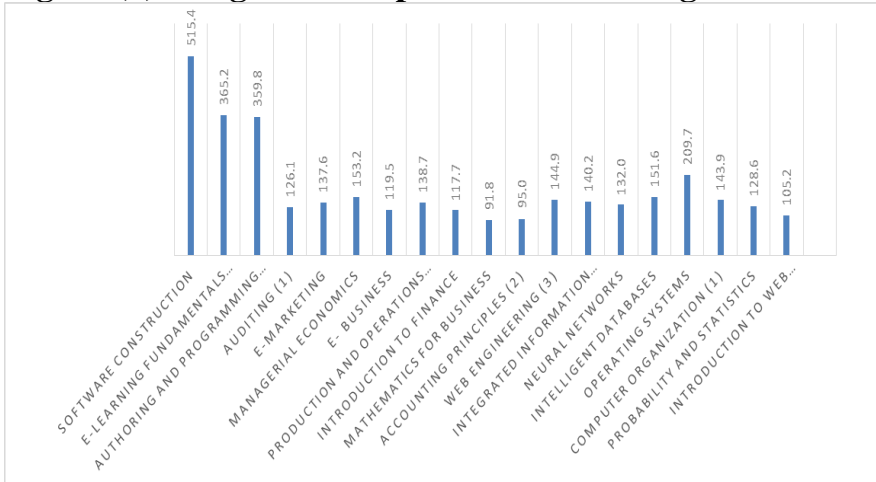


Table (2) also indicates that the “Software Construction” in Software Engineering program is the highest average of student logs (515.4 log records per student), and “Mathematics for Business” in Business Administration program is the lowest average of student logs (91.8 log records per student), and Figure (2) shows that.

Figure (2) : Logs records per students among courses



➤ **Assignments Interactions**

it refers to students’ interactions with Assignments activities in MOODLE course, meaning that any file uploaded by any student within the course assignment activity will be counted.

Table (3)
Student Course Uploading Files and their Percentage

Course	No. of Students	Uploads	Students uploads %	Assignment uploads per student
Introduction to Web Technology	106	370	85.85%	3.5
Probability and Statistics	98	368	90.82%	3.8
Computer Organization (1)	114	475	91.23%	4.2
Operating Systems	109	360	86.24%	3.3
Intelligent Databases	151	605	93.38%	4.0
Neural Networks	182	705	96.15%	3.9
Integrated Information Systems	142	610	100.00%	4.3
Web Engineering (3)	135	560	99.26%	4.1
Accounting Principles (2)	113	371	84.96%	3.3
Mathematics for Business	142	420	77.46%	3.0
Introduction to Finance	153	463	86.93%	3.0

Course	No. of Students	Uploads	Students uploads %	Assignment uploads per student
Production and Operations Management	92	318	90.22%	3.5
E- Business	78	264	94.87%	3.4
Managerial Economics	85	312	88.24%	3.7
E-marketing	25	55	96.00%	2.2
Auditing (1)	57	190	94.74%	3.3
Authoring and Programming Tools for E-Learning Systems	12	49	100.00%	4.1
E-learning Fundamentals and Principles	9	44	100.00%	4.9
Software Construction	9	50	100.00%	5.6

Table (3) indicates that “Neural Networks” is the highest number of total uploads, which reached (705), the lowest number of files uploaded was “E-learning Fundamentals and Principles”, which reached (44). From this, it is concluded that LMS(Moodle) is a good environment for the practical subjects such as Neural Network that needs interaction between the content and the students more than the theoretical subjects such as E-learning Fundamentals and Principles.

In the other hand, percentage of students who uploaded assignments' files vary from course to another, table (3) indicates that the highest percentage of students who uploaded files (100%) was in the following courses: “Integrated Information Systems”, “Authoring and Programming Tools for E-Learning Systems”, “E-learning Fundamentals and Principles”, and “Software Construction”. This indicates that all students uploaded assignment files in MOODLE.

The lowest percentage of students who uploaded files was in the course of “Mathematics for Business” which achieved (77.46%) as shown in figure (3).

Figure (3): Assignment uploads percentage per course

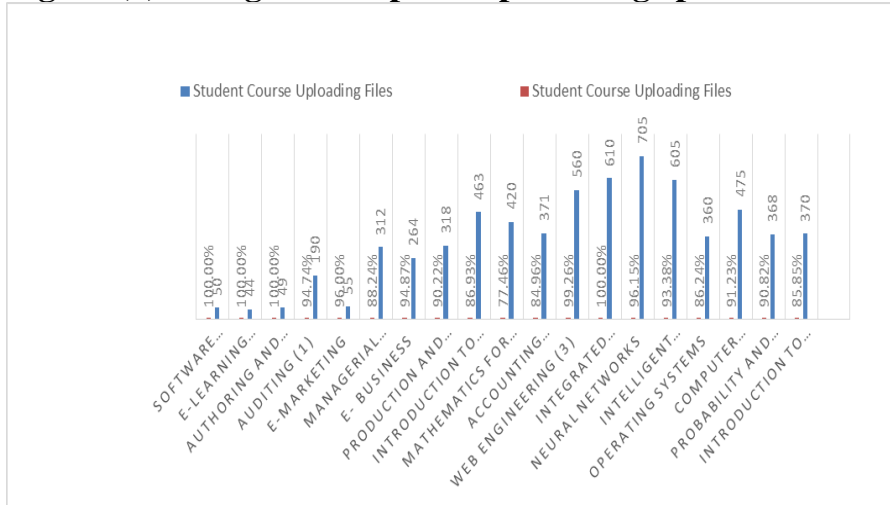
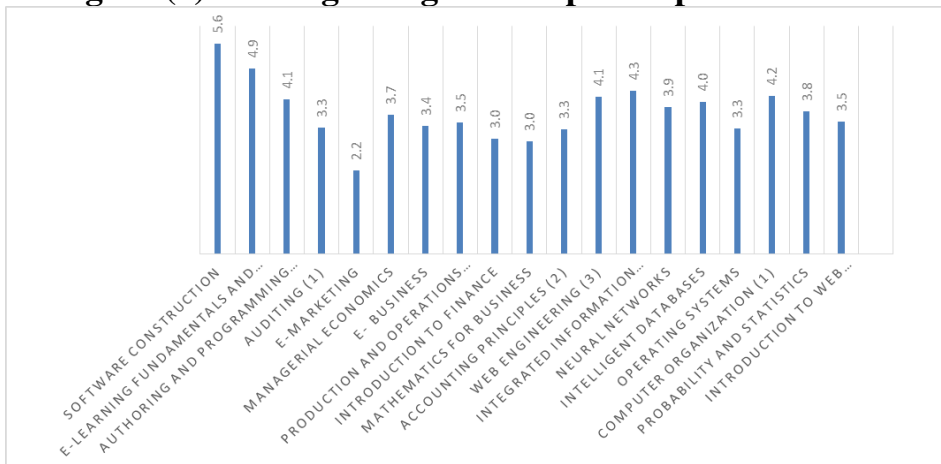


Table (3) indicates that the “Software Construction” in Software Engineering program was the highest average of student assignment uploads records (5.6 uploads per student), “E-Marketing” in Business Administration program was the lowest average of student assignment uploads records (2.2 uploads per student) as shown in figure (4).

Figure (4): Average assignment uploads per student



➤ **Course Views:**

Course views refer to student course views within MOODLE LMS, meaning that the system counts the number of times any student opens a course.

Table (4) Students' course views records

Course	No. of Students	Course Views	Course views %	Course views per student
Introduction to Web Technology	106	5077	100%	47.9
Probability and Statistics	98	5131	100%	52.4
Computer Organization (1)	114	7130	100%	62.5
Operating Systems	109	6691	100%	61.4
Intelligent Databases	151	9627	100%	63.8
Neural Networks	182	10075	100%	55.4
Integrated Information Systems	142	8684	100%	61.2
Web Engineering (3)	135	7315	99.36%	54.2
Accounting Principles (2)	113	4506	97.35%	39.9
Mathematics for Business	142	5289	99.30%	37.2
Introduction to Finance	153	6675	100%	43.6
Production and Operations Management	92	4740	100%	51.5
E- Business	78	3432	100%	44.0
Managerial Economics	85	5176	100%	60.9
E-marketing	25	1353	100%	54.1
Auditing (1)	57	2486	100%	43.6
Authoring and Programming Tools for E-Learning Systems	12	1957	100%	163.1
E-learning Fundamentals and Principles	9	850	91.67%	94.4
Software Construction	9	2057	100%	228.6

Table (4) indicates that “Neural Networks” scored the highest number of course views, which reached (10075). It is understood that there are always references and materials of the subjects that students study to view and study anytime and anywhere on LMS Moodle. The material can vary from video to files or activities they do to understand and practice. The lowest number of course views for “E-

learning Fundamentals and Principles”, which reached (850).

On the other hand, the percentage of students’ views per course vary from course to another. Table (4) indicates that the highest percentage of students’ views per course (100%) scored by “Software Construction”, “Authoring and Programming Tools for E-Learning Systems”, “Introduction to Finance”, “Production and Operations Management”, “E- Business”, “Managerial Economics”, “E-marketing”, “Auditing (1)”, “Neural Networks”, and “Integrated Information Systems”. The lowest percentage of students’ course views scored by “E-learning Fundamentals and Principles” which achieved (91.67%) as shown in figure (5).

Figure (5): Percentage of Course views per course

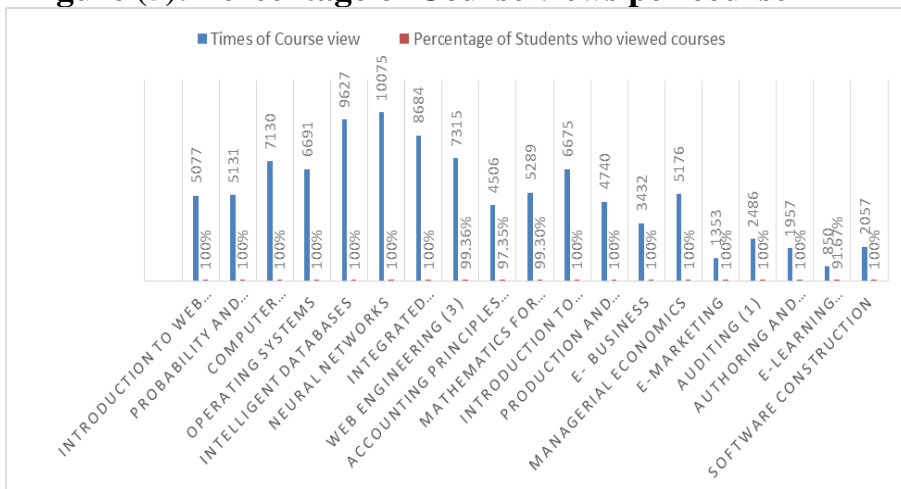
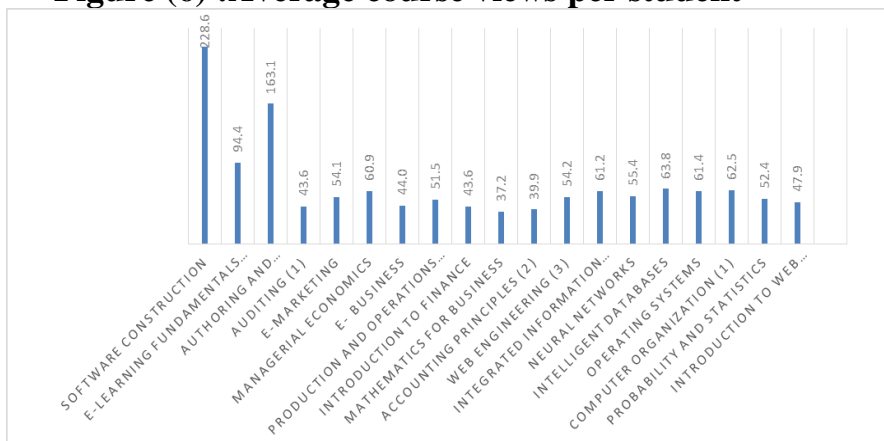


Table (4) indicates that the “Software Construction” in software engineering program achieved the highest frequency of course view per student (228.6), “Mathematics for Business” in Business Administration program was the Lowest of course views frequency per student (37.2) as shown in figure (6).

Figure (6) :Average course views per student



➤ **Quizzes interactions:**

It refers to students' quiz attempts within a MOODLE course.

Table (5) Student Quiz Attempts records

Course	No. of Students	Quiz Attempts	Quiz attempts %	Quiz attempts per student
Introduction to Web Technology	106	0	0.00%	0.00
Probability and Statistics	98	14	10.20%	0.14
Computer Organization (1)	114	20	8.77%	0.18
Operating Systems	109	1098	79.82%	10.07
Intelligent Databases	151	53	12.58%	0.35
Neural Networks	182	39	7.14%	0.21
Integrated Information Systems	142	11	2.82%	0.08
Web Engineering (3)	135	72	14.81%	0.53
Accounting Principles (2)	113	14	11.50%	0.12
Mathematics for Business	142	12	5.63%	0.08
Introduction to Finance	153	322	92.16%	2.10
Production and Operations Management	92	165	92.39%	1.79
E- Business	78	135	92.31%	1.73
Managerial Economics	85	142	91.76%	1.67
E-marketing	25	33	72.00%	1.32
Auditing (1)	57	106	96.49%	1.86
Authoring and Programming Tools for E-Learning Systems	12	0	0.00%	0.00
E-learning Fundamentals and Principles	9	136	91.67%	15.11
Software Construction	9	0	0.00%	0.00

Table (5) indicates that “Operating Systems” achieved the highest number of Quiz Attempts, which reached (1098), while the lowest was “Integrated Information Systems. Which reached (11).

While the courses “Introduction to Web Technology”, “Authoring and Programming Tools for E-Learning Systems”, and Software Construction reached (0) due to the fact that these courses do not include quizzes.

on the other hand, percentage of students who attempted Quiz vary from course to another. Table (5) indicates that the highest percentage of students who attempted the Quiz was in the course of “Auditing (1)” which achieved (96.49%), while the lowest was “Integrated Information Systems. Which reached (2.82%).

while the courses “Introduction to Web Technology”, “Authoring and Programming Tools for E-Learning Systems”, and Software Construction, Which achieved (0%) due to the fact that these courses do not include quizzes as shown in figure (7).

Figure (7) Percentage of students’ quizzes attempts

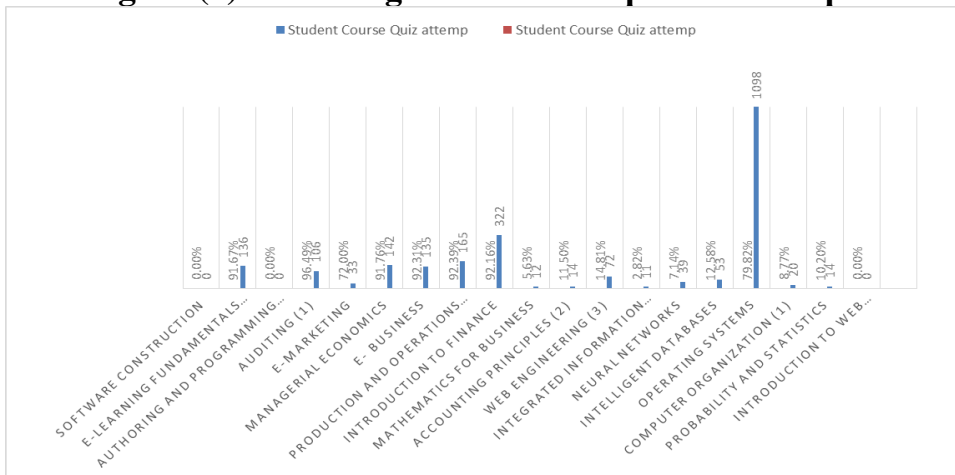
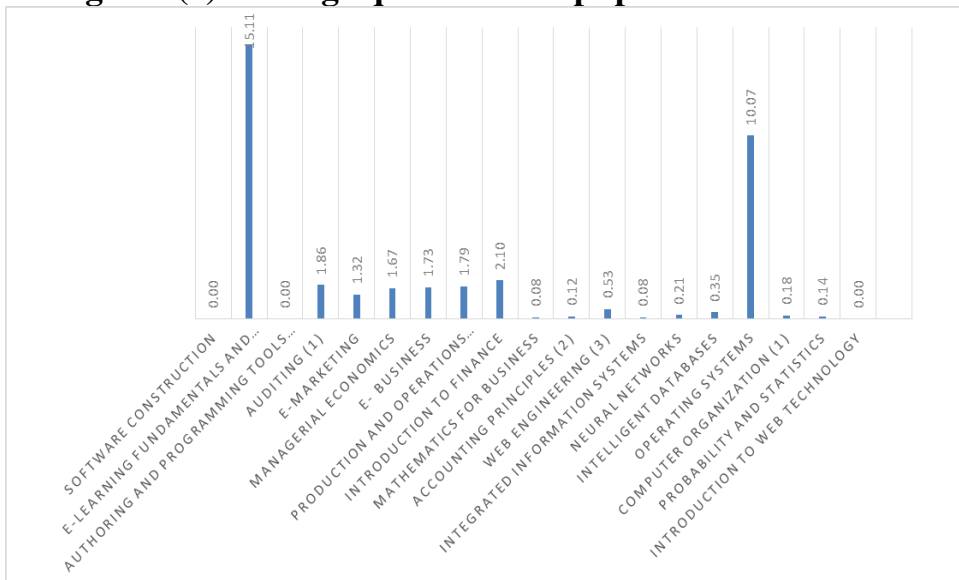


Table (5) indicated that the “E-learning Fundamentals and Principles” in E-learning Diploma Program was the highest frequency of quizzes attempts per student (15.11). “Accounting Principles (2)” in Business Administration Program were the Lowest Frequencies of attempt Quiz (0.012) according to Students number, and Figure (8) shows that.

While the courses “Introduction to Web Technology” in Computers and information Technology Program, “Authoring and Programming Tools for E-Learning Systems” in E-Learning Master Program, and “Software Construction” in Software Engineering Master Program which achieved (0%) due to the fact that these courses does not include quizzes. As a result, the availability of quizzes for the subjects is important for students to let them engage in the course and log. Figure (8) shows that.

Figure: (8) Average quizzes attempt per student



➤ **SCORM Package Views:**

It refers to the number of times students opened course SCORM package in MOODLE.

Table (6) Students SCORM package views records

Course	No. of Students	SCORM Package Views	SCORM Package Views %	SCORM Package Views per student
Introduction to Web Technology	106	20	47.00%	0.189
Probability and Statistics	98	9	11.00%	0.092
Computer Organization (1)	114	5	13.00%	0.044
Operating Systems	109	24	57.00%	0.220
Intelligent Databases	151	8	48.00%	0.053
Neural Networks	182	1	1.00%	0.005
Integrated Information Systems	142	4	4.00%	0.028
Web Engineering (3)	135	3	3.00%	0.022
Accounting Principles (2)	113	7	13.00%	0.062
Mathematics for Business	142	11	4.00%	0.077
Introduction to Finance	153	10	39.00%	0.065
Production and Operations Management	92	0	0.00%	0.000
E- Business	78	1	15.00%	0.013
Managerial Economics	85	0	0.00%	0.000
E-Marketing	25	0	0.00%	0.000
Auditing (1)	57	1	1.00%	0.018
Authoring and Programming Tools for E-Learning Systems	12	0	0.00%	0.000
E-learning Fundamentals and Principles	9	0	0.00%	0.000
Software Construction	9	0	0.00%	0.000

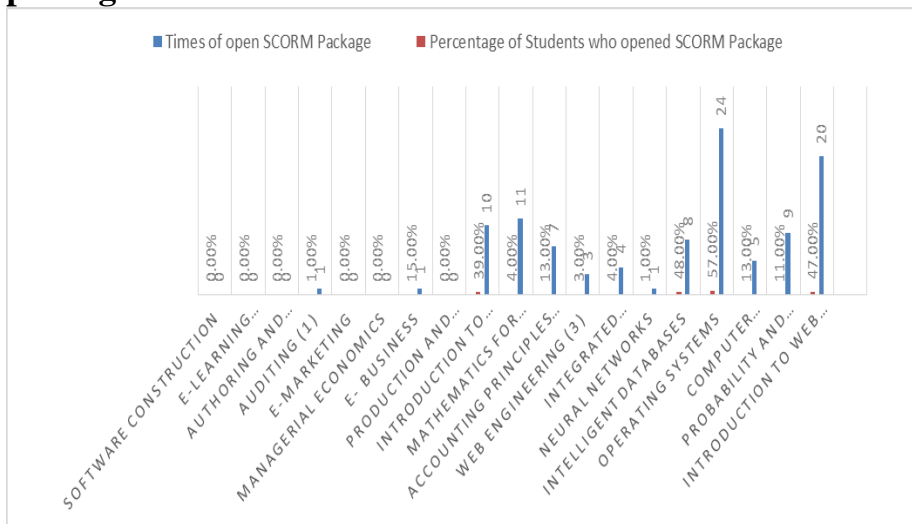
Table (6) indicated that “Operating Systems” course achieved the highest number of SCORM Package Views, which reached (24) views, while the lowest were “Neural Networks”, “E-Business”, and “Auditing (1)” which reached (1) view

“Production and Operations Management”, “Managerial Economics”, “E-Marketing”, “Authoring and Programming Tools for E-Learning Systems”, “E-learning Fundamentals and Principles”, and “Software

Construction”, which reached (0) due the fact that these courses does not include SCORM Package as shown in figure (9) shows that.

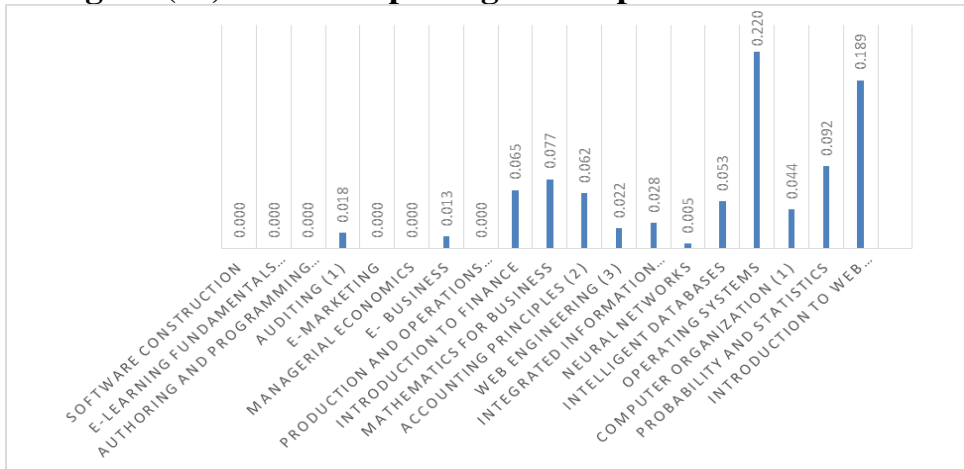
On the other hand, percentage of students who viewed the SCORM Package vary from Course to another. Table (6) indicates that the highest percentage achieved was in “Operating Systems”, and “Auditing (1)” courses which reached (57%), while the lowest were in the courses of “Neural Networks” and “Auditing (1)” which reached (1%)

Figure (9): Percentage of student’s views of SCORM package



In addition, table (6) indicated that the “Operating Systems” in Computers and Information Technology program was the highest in the average views per student which reached (0.220), while the lowest were in the course of “E- Business” which reached (0.013).

Figure (10): SCORM package views per student



➤ **Folder**

It refers to the students’ action to open course materials folder in MOODLE.

Table (7) Folder access records

Course	No. of Students	Number of Folder Access	Percentage of Folder access	Number of Folder access per student
Introduction to Web Technology	106	1448	92.45%	13.7
Probability and Statistics	98	2087	100.00%	21.3
Computer Organization (1)	114	1060	94.74%	9.3
Operating Systems	109	1869	100.00%	17.1
Intelligent Databases	151	3828	100.00%	25.4
Neural Networks	182	2995	100.00%	16.5
Integrated Information Systems	142	2953	100.00%	20.8
Web Engineering (3)	135	1865	100.00%	13.8
Accounting Principles (2)	113	1939	92.04%	17.2
Mathematics for Business	142	2332	96.48%	16.4
Introduction to Finance	153	2217	97.39%	14.5
Production and Operations Management	92	2110	96.74%	22.9
E- Business	78	1302	98.72%	16.7
Managerial Economics	85	2211	97.65%	26.0
E-Marketing	25	585	100.00%	23.4
Auditing (1)	57	1215	100.00%	21.3

Course	No. of Students	Number of Folder Access	Percentage of Folder access	Number of Folder access per student
Authoring and Programming Tools for E-Learning Systems	12	697	100.00%	58.1
E-learning Fundamentals and Principles	9	444	100.00%	49.3
Software Construction	9	0	0.00%	0.0

Table (7) indicates that “Intelligent Databases” course was the highest to achieve number of folder access, which reached (3828), while the lowest “Software Construction” with (0) folder access.

On the other hand, the percentage of students who opened the materials folder vary from course to another. Table (7) indicates that the highest percentage was in the courses of “Probability and Statistics”, “Operating Systems”, “Intelligent Databases”, “Neural Networks”, “Integrated Information Systems”, “Web Engineering (3)”, “E-Marketing”, “Auditing (1)”, “Authoring and Programming Tools for E-Learning Systems”, and “E-learning Fundamentals and Principles”, which achieved (100.00%), while the lowest was in the “Software Construction”, course with (0) Folder access as per figure (11).

Figure (11): Percentage of students' folder access

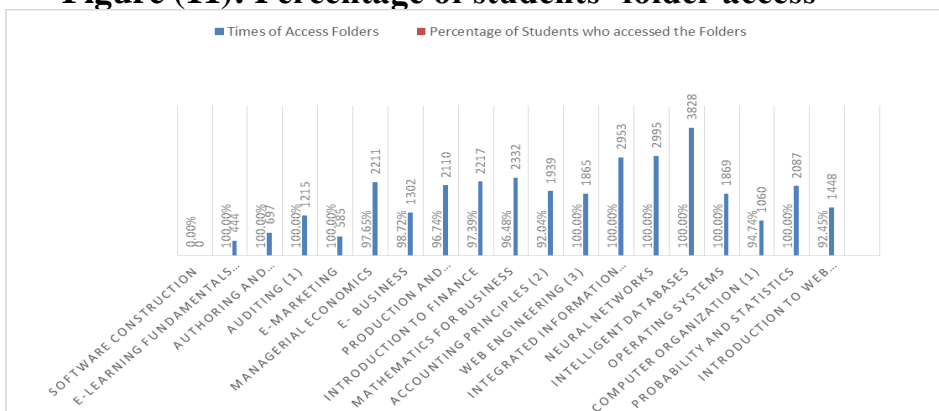
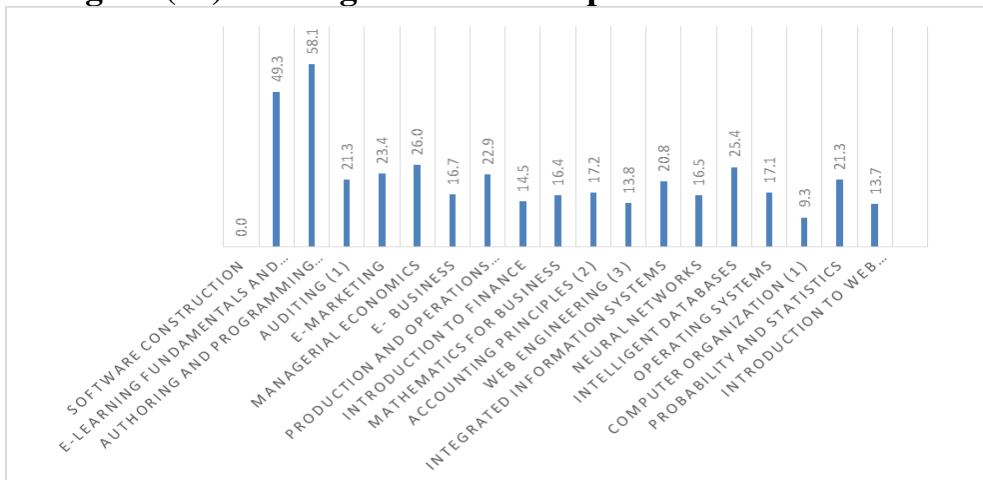


Table (7) also indicated that the “Authoring and Programming Tools for E-Learning Systems” in E-learning Master Program achieved the highest frequency of folder access per student (58.1), “Software Construction” course was the lowest with (0) folder access as shown in figure (12).

Figure (12): Average folder access per student



Findings

In this section, we compared between the programs in students’ e-content engagement through available activities, so we compared between undergraduate programs (IT and Business), Undergraduate and Postgraduate programs, postgraduate programs (IT and Education), and the three sectors at EELU (IT, Business and Education), as follows:

When we look at Logs we find that all students log in the Learning Management System MOODLE according to the style of learning at EELU, also we find that the average of logs per students is between (91.8 : 515.4), this mean that most Students log into Learning Management System daily and most of them log into system multi times at the day.

When we look at Assignment Interactions, we find that most students interact with assignment activities in the

Learning Management System MOODLE according to the style of learning at EELU, also we find that the average of Assignment Interactions per students is between (2.2 : 5.6), this mean that most Students interacted with MOODLE activities into Learning Management System multi times.

When we look at Course Views, we find that most students viewed the courses in the Learning Management System MOODLE according to the style of learning at EELU, also we find that the average of Course Views per students is between (37.2: 228.6), this mean that most Students viewed the courses into Learning Management System and most of them viewed the courses into system multi times at the day.

When we look at Logs, we find that all students Quizzes interactions in the Learning Management System MOODLE according to the style of learning at EELU, also we find that the average of Quizzes interactions per students is between (0.08: 15.11),

When we look at SCORM Package Views, we find that all students SCORM Package Views in the Learning Management System MOODLE according to the style of learning at EELU, also we find that the average of SCORM Package Views per students is between (0.013: 0.220).

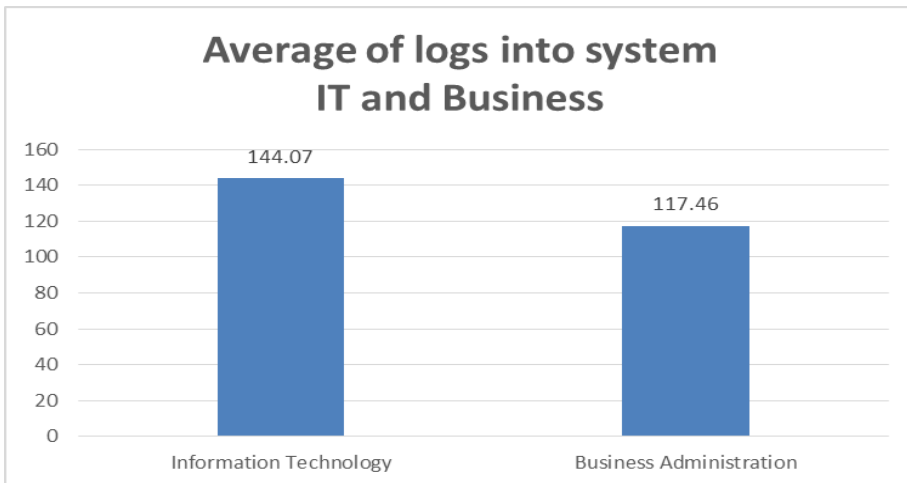
When we look at Folders, we find that most students used Folders in the Learning Management System MOODLE according to the style of learning at EELU, also we find that the average of opening Folders per students is between (9.3: 58.1).

2. To what extent does a student engagement differ with Information Technology students and Business administration students in undergraduate degrees?

Logs

For undergraduate students we find that the average of logs into system for IT students is higher than business students, which IT students reached (144.070) while Business students reached (117.46) as shown in figure (13). Logging into the course depends on its type and how it is related to the students' interests and concerns. That means the students who study IT that is related to computers are more engaged and logged to their courses than the students who study Business Administration.

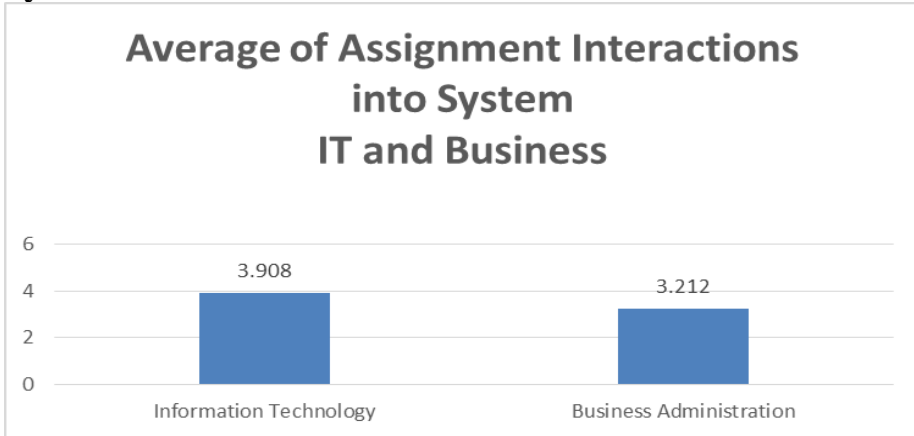
Figure (13): Average of Logs into System for IT and Business Students



Assignment Interactions:

For undergraduate students, we find that the average of Assignment Interactions for IT students is higher than business students, which IT students reached (3.908) while Business students reached (3.212) as shown in figure (14). Both of the two majors of IT and Business administration were careful to interact with their assignments, but the major of IT were more according to the type of the courses that related to the computers studies.

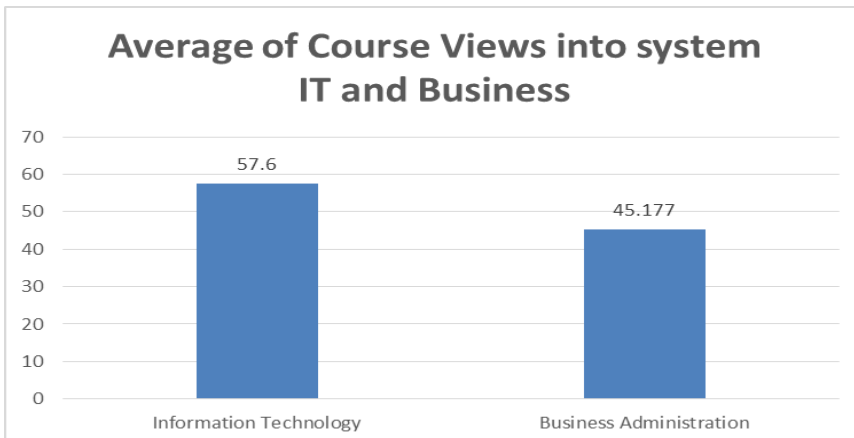
Figure (14): Average of Assignment Interactions into System for IT and Business Students



Course Views:

For undergraduate students, we find that the average of Course Views into system for IT students is higher than business students, which IT students reached (57.6) while Business students reached (45.177) as shown in figure (15). Referring to study computer and everything related to it made the students who majored in IT viewed and interacted with the courses more than Business administration students.

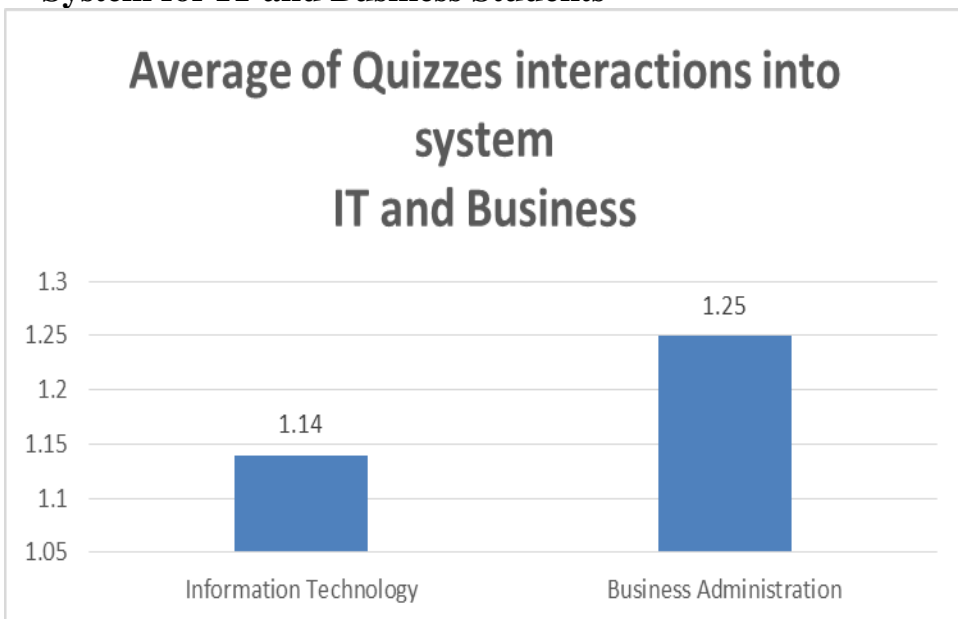
Figure (15): Average of Course View into System for IT and Business Students



Quizzes interactions:

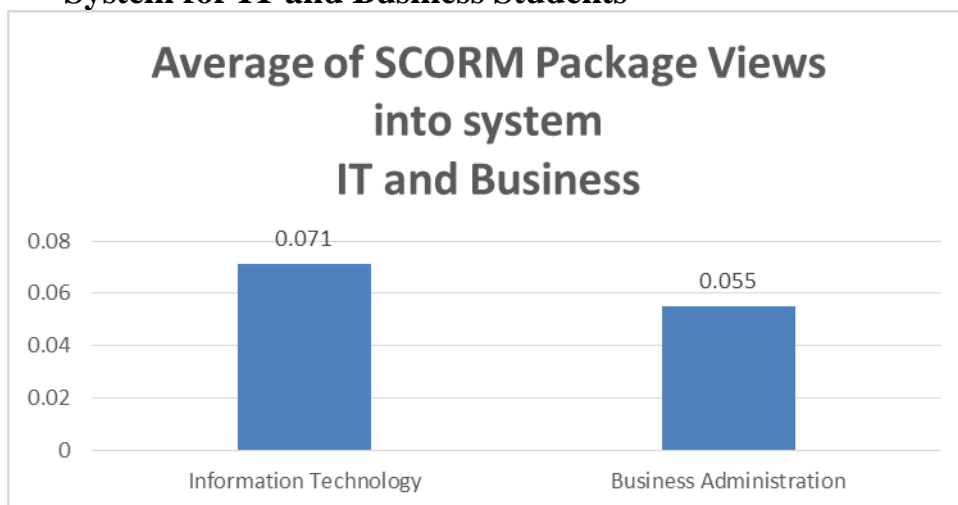
For undergraduate students, we find that the average of Quizzes interactions into system for business students is higher than IT students, which Business students reached (1.25), while IT students reached (1.14) as shown in figure (16). The easiness of using computers and interacting with them made the IT students careful to finish their assignments more Business administration students.

Figure (16): Average of Quizzes Interactions into System for IT and Business Students

**SCORM Package Views**

For undergraduate students we find that the average of SCORM Package Views into system for IT students is higher than business students, which IT students reached (0.071) while Business students reached (0.055) as shown in figure (17). Viewing SCORM package was increased with IT students who were keen to get more knowledge and information than Business Administration students.

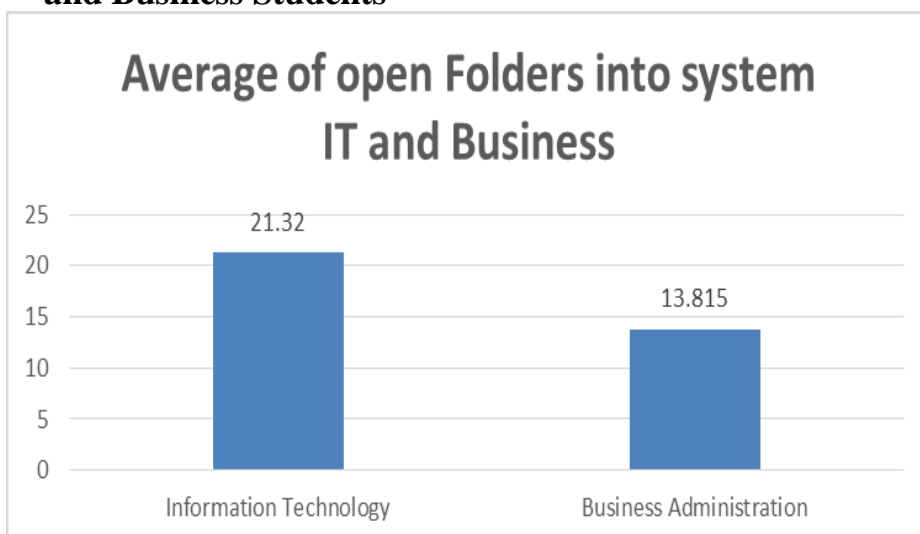
Figure (17): Average of SCORM Package Views into System for IT and Business Students



Folder

For undergraduate students we find that the average of opening Folders into system for business students is higher than IT students, which Business students reached (21.32) while IT students reached (13.815) as shown in figure (18).

Figure (18): Average of Open Folders into System for IT and Business Students

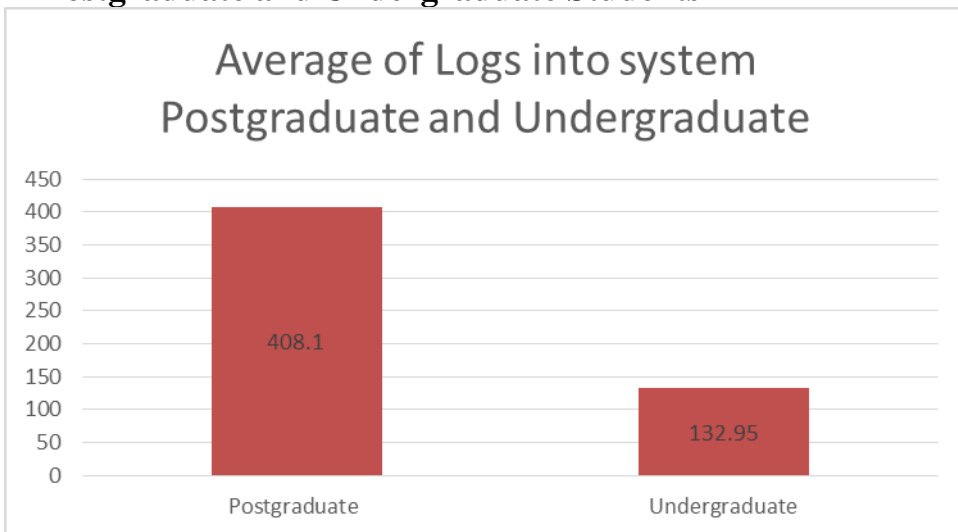


3. To what extent does a student engagement differ in undergraduate and postgraduate degrees?

Logs

When we are comparing postgraduate and undergraduate, we will find that postgraduate students' average of logs is higher than undergraduate students. Postgraduate students reached (408.1) while undergraduate students reached (132.95) as shown in figure (19). According to the age and the interest of studying and getting more knowledge and degrees, It is noticed that the postgraduate students who were more rational and older in their age and their thinking logged to their Major courses than the undergraduate students.

Figure (19): Average of Logs into System for Postgraduate and Undergraduate Students

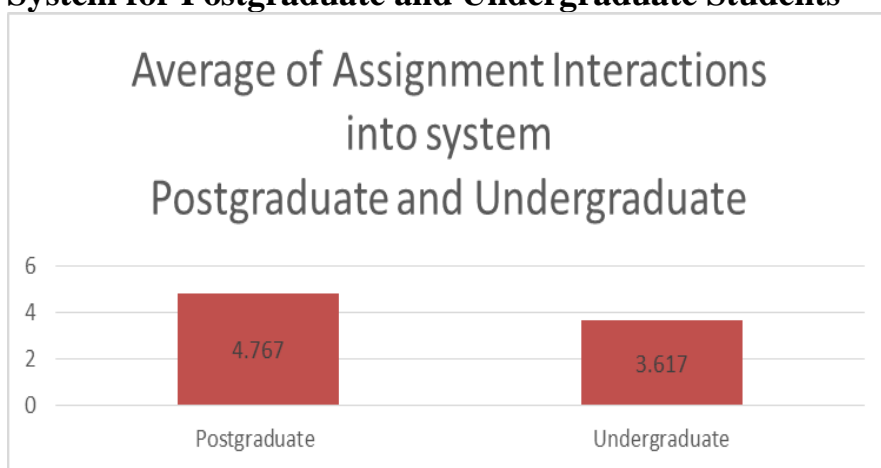


Assignment Interactions

When we are comparing postgraduate and undergraduate, we will find that postgraduate students' average of Assignment Interactions is higher than undergraduate students. Postgraduate students reached (4.767) while undergraduate students reached (3.617) as

shown in figure (20). The more the students get older, the more they get responsible for their duties. From that, it is noticed that the postgraduate students who were older and more responsible for their duties answered and interacted positively with the course assignments more than the undergraduate students who were younger than the postgraduate.

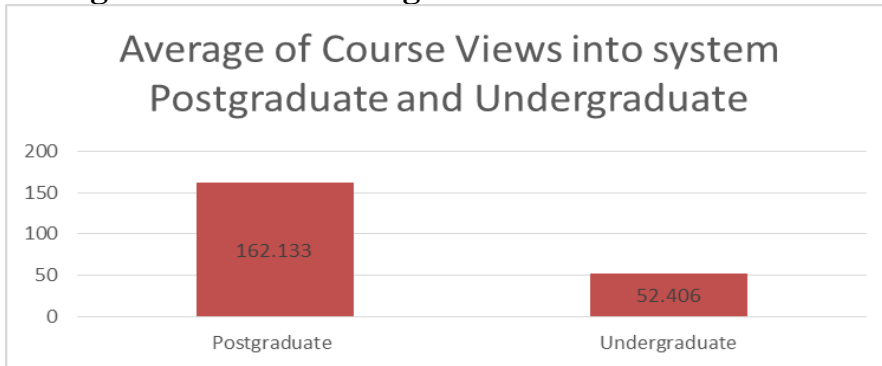
Figure (20): Average of Assignment Interactions into System for Postgraduate and Undergraduate Students



Course Views:

When we are comparing postgraduate and undergraduate, we will find that postgraduate students' average of Course Views is higher than undergraduate students. Postgraduate students reached (162.133) while undergraduate students reached (52.406) as shown in figure (21). Postgraduate students are studying after college and getting jobs to develop their skills and upgrade their position, so they want to study deeply and understand all details of their major and this was so clear from the percentage of their course view which was more than undergraduate students who are obliged to study to get a certificate to get a job.

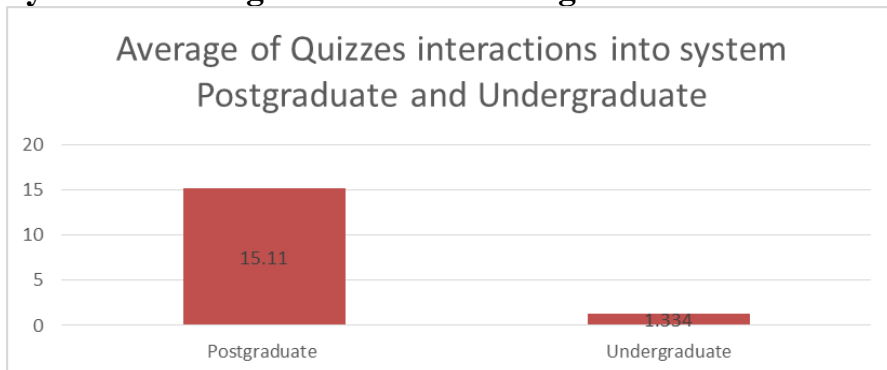
Figure (21): Average of Course View into System for Postgraduate and Undergraduate Students



Quizzes interactions

When we are comparing postgraduate and undergraduate, we will find that postgraduate students' average of Quizzes interactions is higher than undergraduate students. Postgraduate students reached (15.11) while undergraduate students reached (1.334) as shown in figure (22). According to the awareness of postgraduate students to get high marks and understand their study because of their age and feeling of responsibility, they were involved in interacting with their quizzes more than undergraduate students who were younger and had less responsibility.

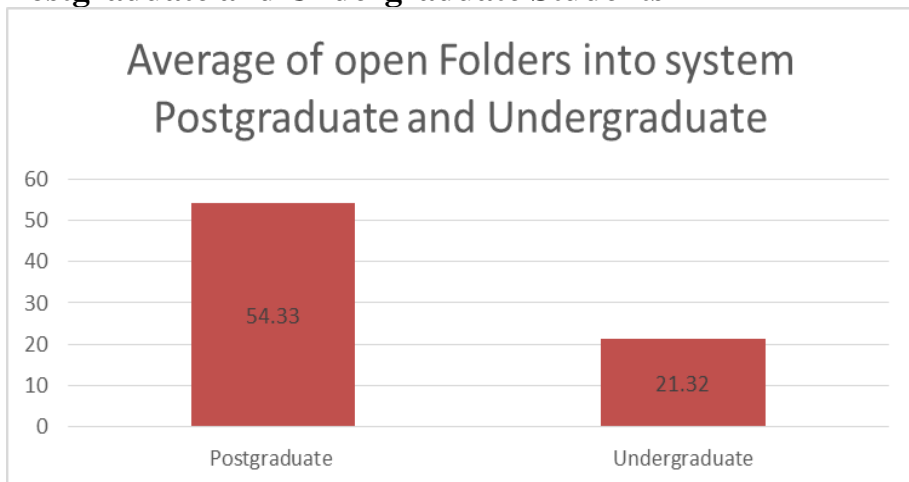
Figure (22): Average of Quizzes Interactions into System for Postgraduate and Undergraduate Students



Folder

When we are comparing postgraduate and undergraduate, we will find that postgraduate students' average of opening Folders is higher than undergraduate students. Postgraduate students reached (54.33) while undergraduate students reached (21.32) as shown in figure (23). Opening folders and checking for more and new knowledge were increased with the postgraduate students than undergraduate for many reasons such as the age, awareness and sophistication which are more with postgraduate students than undergraduate students.

Figure (23): Average of Open Folders into System for Postgraduate and Undergraduate Students



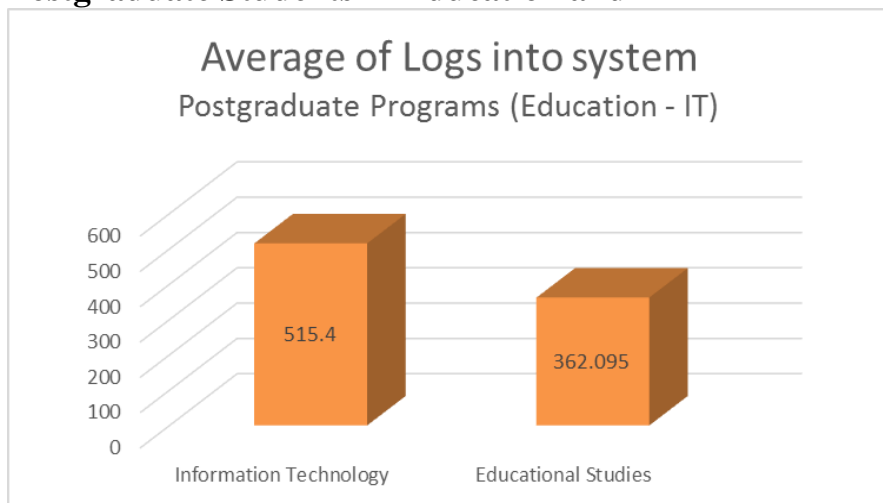
4. To what extent does postgraduate student engagement differ in Software Engineering Master's program and Educational Studies postgraduate program?

Logs

When we are comparing the Postgraduate Programs (Education - IT), we found that IT is higher than Educational Studied, which IT postgraduate studies students' Logs average reached (515.4), while Educational

Studies students' Logs average reached (362.095) as shown in figure (24). In Software Engineering Program, the number of students who logged into the courses was more than the Educational Studies Program due to the practicality of that program and its need to be up to date to the knowledge and the information related to the major.

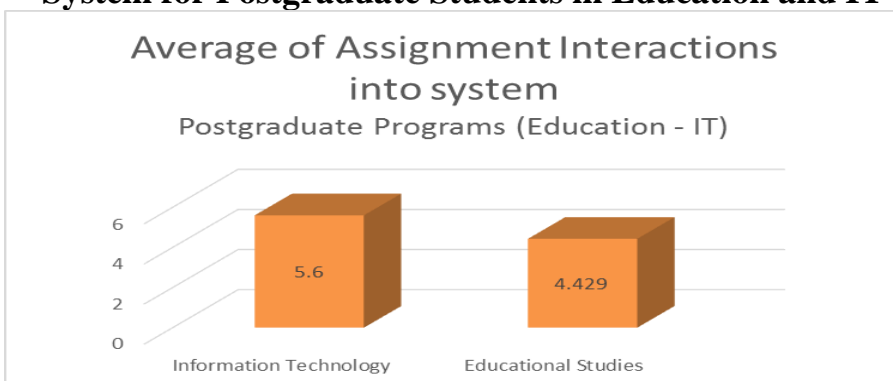
Figure (24): Average of Logs into System for Postgraduate Students in Education and IT



Assignment Interactions:

When we are comparing the Postgraduate Programs (Education - IT), we found that IT is higher than Educational Studied. IT postgraduate studies students' Assignment Interactions average reached (5.6), while Educational Studies students' Logs average reached (4.429) as shown in figure (25). According to the type of the program and its needs to search, understand and practice to succeed in that Major, it can be noticed that the postgraduate students who study IT were involved in answering the assignments of their courses and interacted with them more than the postgraduate students who study educational studies.

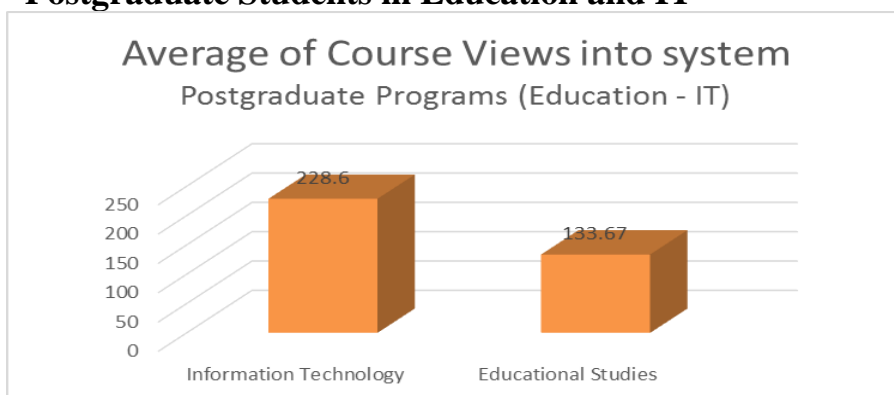
Figure (25): Average of Assignment Interactions into System for Postgraduate Students in Education and IT



Course Views

When we are comparing the Postgraduate Programs (Education - IT), we found that IT is higher than Educational Studied, which IT postgraduate studies students' Course View average reached (228.6), while Educational Studies students' Course View average reached (133.67) as shown in figure (26). The postgraduate students who study IT program were so interested in studying everything related to computer that is why their percentage to view the courses were more than postgraduate students who study educational studies.

Figure (26): Average of Course View into System for Postgraduate Students in Education and IT

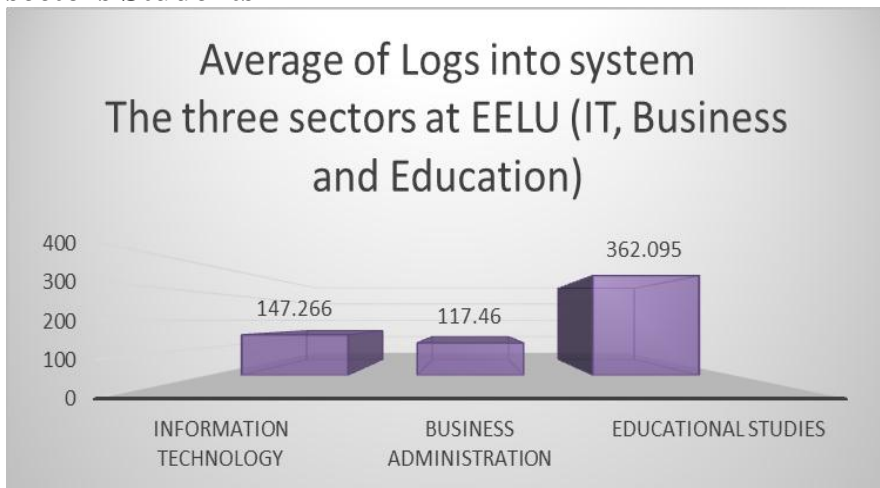


5. To what extent does a student engagement differ in different programs at EELU?

Logs

When we are comparing the three sectors at EELU (IT, Business and Education), we found that Education Sector represented by Faculty of Educational Studies get the highest Average of logs which reached (362.095), then IT sector represented by faculty of Information Technology which reached (147.266), and at last Business Sector represented by Faculty of Business Administration which reached (117.46) as shown in figure (27). Educational studies sector is a program based on collecting more knowledge about education which is updated continuously. As a result, it is understood why the students in the sector of educational studies logged more than the other sectors to be upgraded with the new information and knowledge.

Figure (27): Average of Logs into System for the EELU sectors Students

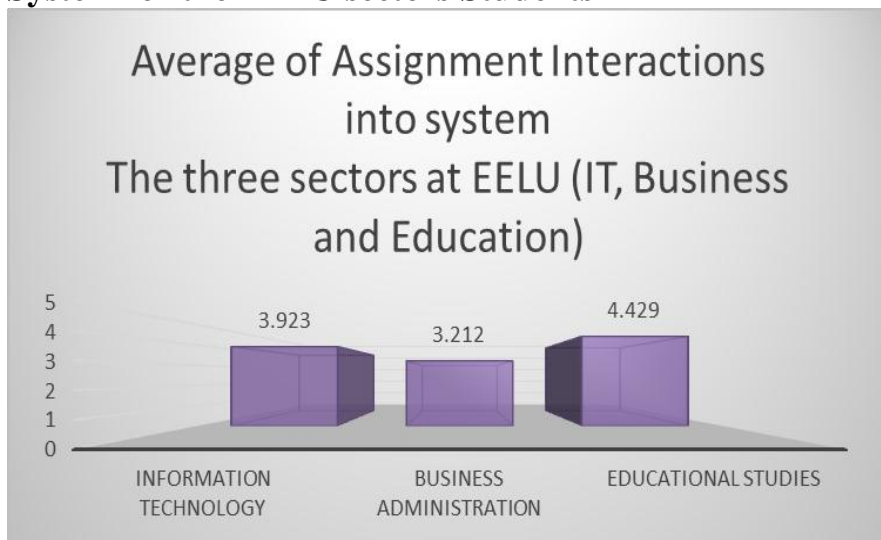


Assignment Interactions:

When we are comparing the three sectors at EELU (IT, Business and Education), we found that Education Sector represented by Faculty of Educational Studies get

the highest Average of Assignment Interactions which reached (4.429), then IT sector represented by faculty of Information Technology which reached (3.923), and at last Business Sector represented by Faculty of Business Administration which reached (3.212) as shown in figure (28). The students whose major is educational studies are more interested in their major more than the others that is why they cared about finishing and interacting with their assignments more than IT or Business students.

Figure (28): Average of Assignment Interactions into System for the EELU sectors Students

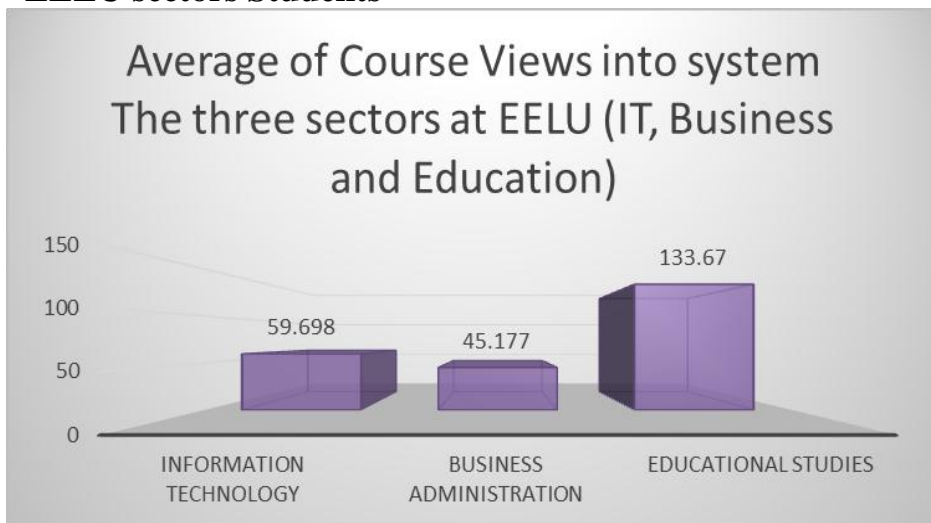


Course Views

When we are comparing the three sectors at EELU (IT, Business and Education), we found that Education Sector represented by Faculty of Educational Studies get the highest Average of Course View which reached (133.67), then IT sector represented by faculty of Information Technology which reached (59.698), and at last Business Sector represented by Faculty of Business Administration which reached (45.177) as shown in figure (29). The comparison shows that the students majoring in

educational studies viewed their courses and followed the uploaded materials more than the students of IT or Business Majors and this refers to their care about their courses and the knowledge that they study more than the undergraduate. Besides, The IT students viewed their courses and check the knowledge to deepen their information more than Business Administration students because of the practicality of their Major.

Figure (29): Average of Course View into System for the EELU sectors Students

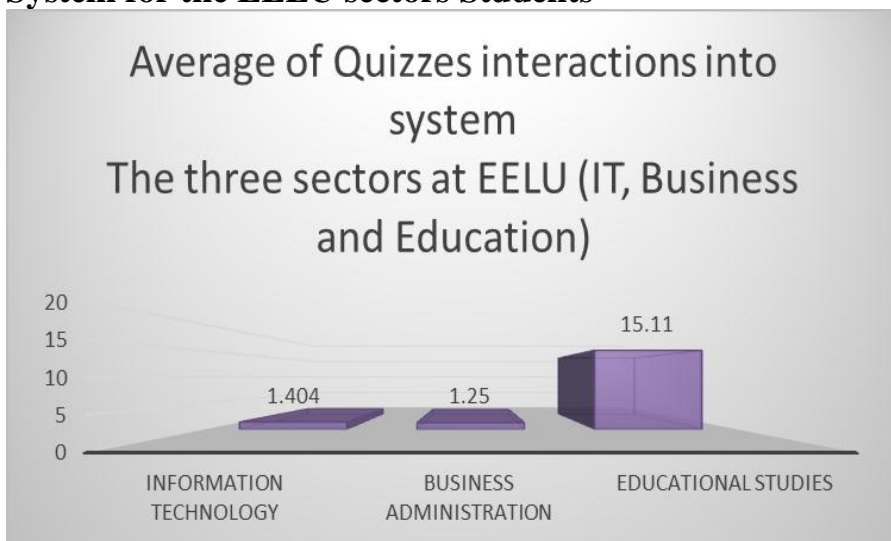


Quizzes interactions:

When we are comparing the three sectors at EELU (IT, Business and Education), we found that Education Sector represented by Faculty of Educational Studies get the highest Average of Quizzes interactions which reached (15.11), then IT sector represented by faculty of Information Technology which reached (1.404), and at last Business Sector represented by Faculty of Business Administration which reached (1.25) as shown in figure (30). It is understood from the comparison that the students who studies educational studies log into the LMS Moodle

to answer and interact with the quizzes for checking and emphasizing their knowledge and their level in understanding the subjects they study more than the students who studies IT or Business Majors.

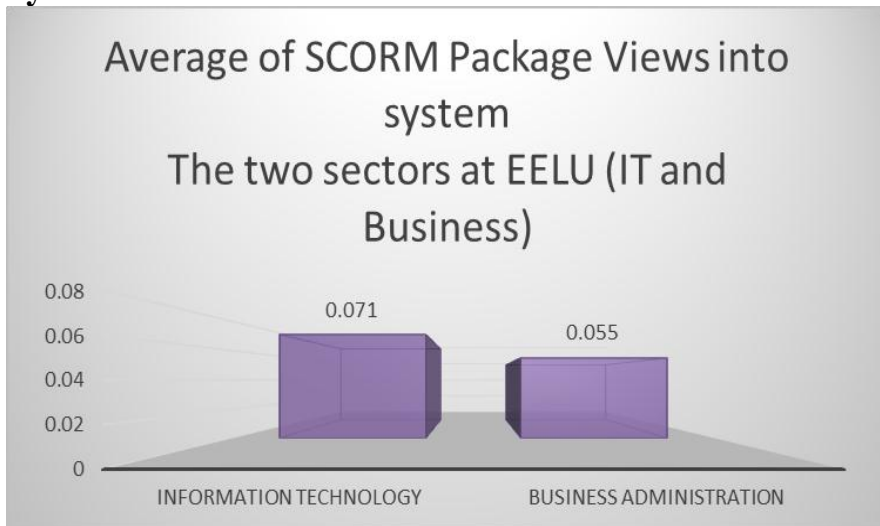
Figure (30): Average of Quizzes Interactions into System for the EELU sectors Students



SCORM Package Views

When we are comparing the two sectors at EELU (IT and Business), we found that IT sector represented by faculty of Information Technology get the highest Average of SCORM Package Views, which reached (0.071), then Business Sector represented by Faculty of Business Administration, which reached (0.055) and Educational Studies is not included because of the design on course did not use SCORM Packages, as shown in figure (31). It is concluded from the result that the major of information Technology needs to get more knowledge, information and read online materials more than the second major Business administration that why IT students viewed the SCORM package more than the Business Administration students.

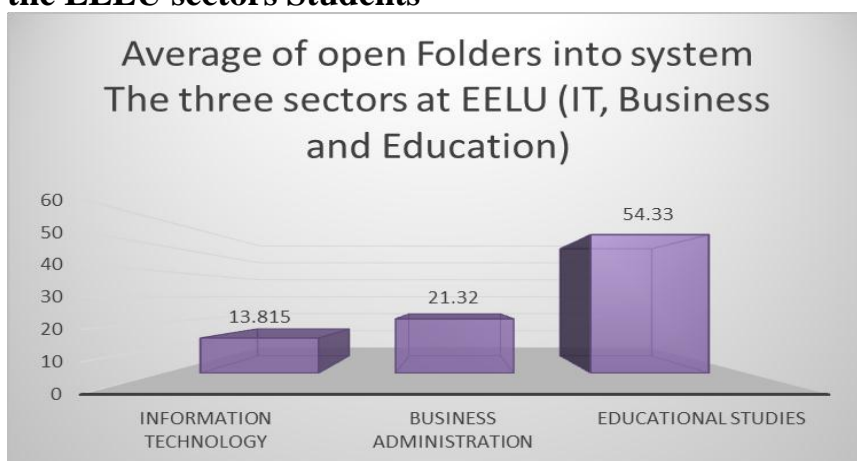
Figure (31): Average of SCORM Package Views into System for the EELU sectors Students



Folder

When we are comparing the three sectors at EELU (IT, Business and Education), we found that Education Sector represented by Faculty of Educational Studies get the highest Average of opening Folders which reached (54.33), then Business Sector represented by Faculty of Business Administration which reached (21.32), and at last IT sector represented by faculty of Information Technology which reached (13.815) as shown in figure (32). It was inferred from the percentage of opening folders that the students who studies educational studies were opening folders into the system more than who studies IT, or business because the educational studies students wanted to deepen their knowledge and cared about checking information and study more than the others.

Figure (32): Average of Open Folders into System for the EELU sectors Students



Discussion

It can be deduced from this study that the nature of the course (the field of study) is one of the main factors that plays a vital role in a student engagement. Indicators of engagement in the online classroom can be monitored via three primary avenues: system logs, assignment interactions, and course views. The results revealed that students in the College of Information Technology courses reported a stronger sense of engagement in learning compared to students in Business Administration and Educational Studies courses. The results showed that the students enrolled in the Software Construction course in the IT postgraduate program scored the highest number of system logs (Average 515.4 per student). In addition, it was found that students enrolled in the Software Construction course in the IT postgraduate program scored the highest number of assignment uploading (5.6 per student). Moreover, it was found that students enrolled in the Software Construction course in the IT postgraduate program scored the highest number of course views (228.6 per student).

The findings of the study also indicated that the level of study is essential in student engagement. The students enrolled in postgraduate studies are more engaged compared to those who are enrolled in undergraduate studies. The results showed that the system logs of the students enrolled in the Software Construction course in the IT postgraduate program scored an average of (515.4) per student whereas the highest score of system logs of the undergraduate students was an average of (209.7) in the Operating System course. The results also showed that assignment uploading of the students enrolled in the Software Construction course in the IT postgraduate program scored an average of (5.6) per student whereas the highest score of assignment uploading of the undergraduate students was an average of (4.3) in Integrated Information Systems course. Furthermore, the results showed that the course views of the students enrolled in the Software Construction course in the IT postgraduate program scored an average of (228.6) per student whereas the highest score of course views of the undergraduate students was an average of (63.8) in the Intelligent Databases course. As we know that the postgraduate students who are studying deeply specific major need to practice, understand and interact with materials more than undergraduate students. As a result, the scores of logs, assignments interaction and answering quizzes are higher than the undergraduate students which refer to the direct relation between a student engagement and his/her understanding, interaction and practicing the subjects he/she studies.

Conclusion

One of the basic components of effective online teaching or any other teaching is a student engagement. Therefore, it is vital to learn what engages students in order to offer effective online learning environments. A student

engagement is considered as a defining characteristic of high-quality teaching and learning in higher education. The researcher believes that by analyzing the focus and degree of a student engagement, it is possible to address the problems associated with the apparent vagueness of student engagement. Consequently, this study seeks to evaluate the behavior of the students of the Egyptian E-Learning University (EELU) and their interactions with the electronic content provided through the University's learning management system LMS. It aims at investigating the level of student engagement with e-content at the (EELU).

To analyze a student engagement with the e-content, the study examined the following indicators: System Logs, Assignment Interactions (Views and Uploads), Course Views, Quizzes Interactions, SCORM Package Views, Files and Folders Views. In this study the population was the students enrolled in both undergraduate and postgraduate programs at the (EELU). The study followed a descriptive approach through collecting and analyzing data related to students' online activities within courses delivered through Learning Management System (Moodle) during the academic semester of Spring 2016/2017

The results obtained via the analyses conducted revealed that the e-content engagement of the students enrolled in the faculty of IT was generally higher than those enrolled in the faculty of Education and the faculty of Business. It was also found out that the e-content engagement was in favor of the students enrolled in the postgraduate programs. These findings provide evidence that the e-content engagement of the students varies according to the field and the level of studying.

This study has revealed more challenging questions about relations between different foci and degrees of student engagement and explore the implications of these questions

for future research and policy initiatives related to student engagement. Ultimately, it is worth saying that if it is possible to find e-teaching methods that can accommodate different e-learning styles then we are likely to encourage better e-content engagement and therefore see an improvement in overall student academic achievement on e-learning based courses.

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