



**DEVELOPMENT AND EVALUATION OF AN ONLINE COURSE FOR  
IRAQI STUDENTS USING GOOGLE COURSE BUILDER: AN ANALYSIS  
USING THE TECHNOLOGY ACCEPTANCE MODEL**

**HUSSEIN HAMRANY**

**NOVEMBER 2016**

**DEVELOPMENT AND EVALUATION OF AN ONLINE COURSE FOR  
IRAQI STUDENTS USING GOOGLE COURSE BUILDER: AN ANALYSIS  
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**A THESIS SUBMITTED TO  
THE GRADUATE SCHOOL OF NATURAL AND APPLIED  
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**BY  
HUSSEIN HAMRANY**

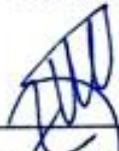
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Submitted by **Hussein HAMRANY**

Approval of the Graduate School of Natural and Applied Sciences, Çankaya University.

  
\_\_\_\_\_  
Prof. Dr. Halil Tanyer EYYUBOĞLU  
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

  
\_\_\_\_\_  
Assoc. Prof. Dr. Fahd JARAD  
Head of Department

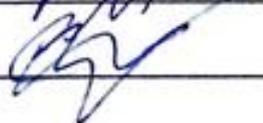
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\_\_\_\_\_  
Assist. Prof. Dr. Murat SARAN  
Supervisor

**Examination Date: 14.11.2016**

**Examining Committee Members**

Assist. Prof. Dr. Özgür Tolga PUSATLI (Çankaya Univ.)  
Assist. Prof. Dr. Murat SARAN (Çankaya Univ.)  
Assist. Prof. Dr. İhsan Tolga MEDENİ (Yıldırım Beyazıt Univ.)

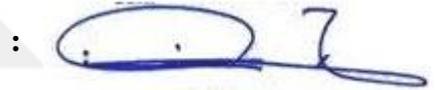
  
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## STATEMENT OF NON-PLAGIARISM PAGE

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Last Name : Hussein HAMRANY

Signature :



Date : 14/11/2016

## ABSTRACT

### DEVELOPMENT AND EVALUATION OF AN ONLINE COURSE FOR IRAQI STUDENTS USING GOOGLE COURSE BUILDER: AN ANALYSIS USING THE TECHNOLOGY ACCEPTANCE MODEL

HAMRANY, Hussein

M.Sc., Department of Information Technology

Supervisor: Assist. Prof. Dr. Murat SARAN

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The main aim of this study is to investigate the effectiveness of e-learning and to reveal the students' perceptions about e-learning and any possible obstacles. An online e-learning course was developed during the study. In order to reveal the possible obstacles and students' perceptions about e-learning, the Technology Acceptance Model (TAM) is used. The results of this study might help to support the spread of e-learning in Iraq. An online course utilizing *Google Course Builder* was developed in order to help Iraqi immigrant students who cannot enroll at, or go to, schools. To evaluate the effectiveness of e-learning for Iraqi students, a descriptive research study was conducted to investigate the opinions of the students about e-learning and to uncover obstacles of implementing e-learning for Iraqi immigrant students. According to the questionnaire that was created for the students and, all the students found that the e-learning course was easy to use and it would improve their learning performance. The majority of the students found that an e-learning course could make it easier to study course content. All the students also found that studying through an e-learning online course was a good idea to help them to improve their learning performance. Moreover, all the students found that the e-learning course

was important to them as students and the majority of them found that it was important for them to take an e-learning course in order to prepare for future work.

**Key Words:** e-learning, Google Course Builder, Technology Acceptance Model



## ÖZ

# IRAKLI ÖĞRENCİLER İÇİN GOOGLE DERS OLUŞTURUCU KULLANARAK ÇEVİRİMİÇİ BİR DERS GELİŞTİRİLMESİ VE DEĞERLENDİRİLMESİ: TEKNOLOJİ KABUL MODELİ KULLANARAK BİR ANALİZ ÇALIŞMASI

HAMRANY, Hussein

Yüksek Lisans, Bilgi Teknolojileri Anabilim Dalı

Tez Yöneticisi: Yrd. Doç. Dr. Murat SARAN

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Bu çalışmanın temel amacı, Iraklı öğrenciler için elektronik öğrenmenin etkinliğini araştırmak ve elektronik öğrenme hakkında öğrencilerin algılarını ve olası zorlukları ortaya koymaktır. Bu çalışmada Google Ders Oluşturucu (Google Course Builder) kullanarak çevrimiçi bir elektronik öğrenme dersi geliştirilmiştir. Elektronik öğrenme ile ilgili olası engelleri ve öğrencilerin algılarını ortaya çıkarmak için, Teknoloji Kabul Modeli (Technology Acceptance Model) kullanılmıştır. Bu çalışmanın sonuçları, Irak'ta elektronik öğrenmenin yayılmasını desteklemek için yardımcı olabilir. Elektronik öğrenmenin Irak'lı göçmen öğrenciler için etkinliğini değerlendirmek ve karşılaşılabilecek muhtemel zorlukları ortaya çıkarmak amacıyla bir tanımlayıcı araştırma çalışması yapılmıştır. Bu amaç için geliştirdiğimiz ve uyguladığımız anket sonuçlarına göre elektronik öğrenmenin kullanımı tüm öğrenciler için kolay olduğu ve onların performansını geliştirdiği ortaya çıkmıştır. Öğrencilerin çoğunluğu bir e-öğrenme dersini ders içeriklerini izlemek için daha

kolay bulmuşlardır. Elektronik öğrenim yoluyla çevrimiçi dersi takip eden tüm öğrenciler bunun iyi bir fikir olduğunu ifade etmişlerdir. Tüm öğrenciler elektronik öğrenme kursunun kendileri için önemli ve faydalı olduğunu ve bunların çoğunluğu onların gelecekteki iş hayatlarına zemin hazırlamak üzere önemli olduğunu ortaya koymuştur.

Anahtar Kelimeler: e-öğrenme, Google Ders Oluşturucu, Teknoloji Kabul Modeli

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## **LIST OF ABBREVIATIONS**

ICFI	International Committee of the Fourth International
TAM	Technology Acceptance Model
LMS	Learning Management System
GAE	Google App Engine
ICT	Information and Communication Technology



## CHAPTER 1

### INTRODUCTION

#### 1.1 Purpose of the Study

For the last four decades, Iraq has faced several wars which have affected the Iraqi people in many ways in terms of their security, economy and educational environments. According to a report published by the International Committee of the Fourth International (ICFI) [1]:

- Nearly one quarter of Iraq's children suffer from chronic malnutrition.
- The probability of dying before 40 years old for Iraqi children born between 2000 and 2004 is approximately three times the level in neighboring countries.
- Three out of four Iraqi families report an unstable supply of electricity.
- 40 percent of families in urban areas live in neighborhoods where sewage can be seen in the streets.
- More than 722,000 Iraqi families have no access to either safe or stable drinking water.
- The jobless rate for young men with secondary or higher education stands at 37 percent.

In addition to the findings listed above, the UNICEF-supported survey [2] shows that one-third of all primary schools in Iraq lack any water supply and almost half are without any sanitation facilities. For these reasons, many Iraqis are forced to leave Iraq for other countries either temporarily or even permanently while assuming the nationalities of their new countries. For the last few years, Iraq has suffered from a new wave of racism and sectarian terrorism that has plagued many big cities such as

Mosul, Salahuldeen, and Anbar, which represent one third of the land area of Iraq. This new and hitherto unseen kind of occupation has forced several millions to emigrate from those cities to other countries or to other cities in Iraq thereby saving their lives. Many of these immigrants are school-aged children who also leave their schools. After the settlement of these immigrants, they lose any hope of returning home in the near future and of course they desire for their children to continue their education.

New Iraqi private schools are being opened in a number of countries, including Turkey, where many of these schools can be found. All these private schools are under the aegis of the Iraqi Ministry of Education and thus give the same courses as schools in Iraq. However, the fees for these private schools are high, amounting to \$2000 per student per year. As a result, not all parents are able to send their children to such schools if they have more than one child.

There is a new system in these private schools which exempts students from daily attendance but allows them to do midterm and final exams. This new system may be less expensive but students will lose teacher support and direction, thereby forcing the student to depend on himself or his family for educational support. Moreover, this is due to the fact that every course is new for the student. This is difficult situation for the student and his family, especially if family members are not well educated. Therefore, the student will encounter many difficulties when doing exams.

This new kind of system allows access lectures not only for students abroad but also for all immigrant students inside Iraq who live in the temporary camps. All of these students cannot attend school so they only do midterm and final exams. They live in not-so-ideal situations but are required to study in order to do their exams. For all these reasons, it is necessary to find a way to help such students, and we believe that e-learning may help these students.

The main aim of this study is to investigate the effectiveness of e-learning and to reveal the students' perceptions about e-learning and any possible obstacles. An online e-learning course was developed during the study. In order to reveal the possible obstacles and students' perceptions about e-learning, the Technology Acceptance Model (TAM) is used [21]. In this study, *Google Course Builder* was

used as an online Learning Management System. Although there are many alternatives such as Moodle, Sakai, Docebo, etc., *Google Course Builder* was selected as a Learning Management System for the following reasons:

- Massively scalable because it runs on Google cloud infrastructure.
- Is a free.
- Support multiple courses on the same instance.
- Support for Google Analytics and Google Tag Manager.
- Is relatively quick to get up and running.

The results of this study might help to support the spread of e-learning in Iraq in order to deliver educational and cultural learning materials. The aim of this research is not to give us an understanding of only the types of students mentioned previously. Any student may receive assistance from this research even if he is a regular student and attends school daily. They can use it to re-explain or re-declare what was missed or what was not understood well. We know that not all students are of the same level of intelligence and that they do not understand at the same rate. Therefore, every student can use the research by replaying the course repeatedly until satisfactory understanding is achieved.

## **1.2 Significance of the Study**

E-learning courses are specifically delivered via the Internet, and not necessarily the traditional classroom in which the teacher may be found. It is not a course delivered via DVD or CD-ROM, or via a television channel. It is interactive such that students can also communicate with their teacher or with other students in the class.

In this study, *Google Course Builder* is used as an online learning management system. *Course Builder* is an open source, online education platform developed by Google. It is cost effective as it reduces the high costs of traditional teaching and schools. Students can register at school and not attend lessons and just sit for exams, which will save the money of those who are in dire need for it.

This also saves time when we know that many immigrant students are required to work during the day to help their families. Therefore, they are able to work during the day and access online courses at night. Since courses are available on the Internet, students are able to have access their courses 24 hours per day and whenever the Internet is available.

*Course Builder* allows the instructor or teacher to track students' progress by means of a number of small quizzes or questions at the end of every lesson in order to prepare for exams at the end of the entire course. Course content and understanding of the students can be evaluated by the teacher. *Course Builder* has good course analytics on student behavior, such as enrollment and it can integrate with *Google Analytics* and *Google Tag Manager*.

It also allows creating, editing, recognizing and deleting external links, course units and lessons. In Course Builder, we can create announcements that can be reached by all students if the instructor wants to take the attention of the students for some important news or subjects. The students are allowed to self-register for courses and they can withdraw themselves from the course. We can use Course Builder to create our online course(s) whether it is for entire university, corporate product or professional training. It is relatively easy to set up and run, since it works on Google cloud infrastructure meaning that no server is required.

In the literature, there are studies using TAM model to investigate the students' acceptance of e-learning course. For example, in a study the researchers stated that "On average, non-users of e-learning have expressed their intention to use e-learning technology in hybrid learning environments when engaging in their teaching practice. It was determined that selected demographic characteristics (gender, age, teaching, academic rank) did not have a direct influence on behavioral intention of teachers with regards to accepting e-learning in hybrid learning environments" [3].

Another research find that "With the development of the Internet in the era of knowledge-driven economy, e-learning is experiencing rapid growth. The online learning course websites are drawing more attention as well. This research combines the innovation diffusion theory and the technology acceptance model, and adds two research variables, perceived system quality and computer self-efficacy to propose a

new hybrid technology acceptance model to study students' behavioral intentions to use the online learning course websites.” [4].

You may want to create custom analytics that is neither available with the built-in analytics or with Google Analytics. In this case, you can send your data from your Course Builder course into Google BigQuery. This allows you to arbitrarily query a massive database using SQL queries against append only table using the processing infrastructure. This allows to create, edit, recognize and delete external links, course units and lessons. An example BigQuery code can be seen below:

**Example BigQuery:**

```
bq query --nosync --destination_table=mydataset.mythesis "SELECT name,count  
FROM mydataset.names_2016 WHERE gender = 'M' ORDER BY count DESC LIMIT 6"
```

Within *Course Builder*, we can create announcements that can reach every student if the instructor wishes to bring to the attention of students a number of important items or subjects. The students are allowed to self-register for courses and they can discontinue enrollment themselves. We can use it to create our online course whether for an entire university, for a corporate product or for professional training. It is relatively quick to set up and run and it works within the Google cloud infrastructure.

### 1.3 Research Questions

The research questions are listed below:

1. To what extend do Iraqi students find e-learning useful for their Chemistry learning?
2. To what extend do Iraqi students use the online e-learning course in their Chemistry learning?

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Definition of E-Learning

Past studies give various meanings of, and equivalent words for, e-learning, which in reality, makes it difficult to create a generic definition. Since the 1960s, e-learning has advanced at all levels in all areas, including business, education, training and the military. Along these lines, e-learning has different implications in various areas. Numerous analysts have endeavored to present a broad meaning of e-learning from alternate points of view, including researching the historical backdrop of e-learning; contrasting the implications from different connections and works on exploring the innovations utilized in the frameworks, creating systems and looking at hypothetical positions of e-learning (teaching methods) in every period. E-learning is known by different terms, including PC helped guideline, PC-based preparation, PC oversight direction, course administration framework, coordinated learning frameworks, intelligent sight and sound guidelines, learning administration framework, innovation based learning, innovation improved learning, electronic preparation, etc. There are a few cases of different meanings of e-learning by utilizing these terms.

- Web-based training is “a training method for distance learning that uses the technology of the Web, the Internet, Intranets and extranets [5].
- Web-based instruction is “a hypermedia-based instructional program, which utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported” [6].
- Virtual Learning is “the educational process of learning over the Internet without having face-to-face contact” [7].

- Online learning is synonymous with web-based learning where learning is delivered via the www only, in an intranet or Internet [8].
- Technology-based training is “a wide set of applications and processes including computer-based learning, virtual classrooms, and digital collaboration” [9].
- Condie and Livingston [10] note that e-learning is “a range of activities, from the effective use of digital resources and learning technologies in the classroom, through to a personal learning experience enabled through individual access at home or elsewhere”.
- According to Holsapple and Lee-Post [11], e-learning is “the process of extending learning or delivering instructional materials to remote sites via the Internet, intranet/extranet, audio, video, satellite broadcast, interactive TV, and CD-ROM”.
- Huei [12] stated that e-learning is the product of emerging technology which turns traditional class courses into online courses. Nicholson [13] added that e-learning is a new form of learning that utilizes the Internet to deliver customized, often interactive, learning materials and programs to diverse local and distant communities in practice.
- E-learning is defined as instructional content or learning experiences delivered by electronic technology at any time or to any place [14].
- The U.S. Department of Education’s Office of Education Research and Improvement [15] defines e-learning as the application of telecommunications and electronic devices which allow students and learners to receive educational instruction from remote locations.

As mentioned above, there are various definitions of e-learning. Based on these definitions, e-learning:

- Utilizes new mixed media innovations, Internet learning stages, types of gear, video conferencing, multimedia accessory and web testing sites.
- Backs up and upgrades the nature of the education and learning process.
- Is the transference of an expansive exhibition of directions that upgrade learning?

- Encourages instant and powerful circulation of learning and data.
- Facilitates an educating and learning experience at a distance.
- Is Inter- or Intranet based, permitting acquisition of the same material from unique locations at the same time (synchronous) and/or varying (non-concurrent) times.

The term *e-learning* in this study is characterized as learning or preparing exercises in an association bolstered by the utilization of data and corresponding innovations. E-learning permits educators and learners to be in different locations at different times. Furthermore, in e-learning, course content, appraisals, direction and criticism can be conveyed as assorted mixed media through online channels. It is critical to understand that e-learning not only includes passing electronically encoded data through the system; it also incorporates learning works on, thereby giving intuitive feedback and direction.

## **2.2 Effectiveness of E-Learning**

E-learning as a revolution in instruction of the 21st century that has numerous advantages over traditional learning. E-learning has become well known to educationists due to the qualities and points of interest it gives to the instructive procedure.

E-learning has progressively thrived in associations. It is becoming noticeable that e-learning is becoming ordinary for instructional designers, human execution technologists, coaches, HR experts, and end-client learners. Similarly, e-learning is showing up in authoritative preparation as it empowers predictable preparation conveyance by means of the Internet in various areas. There are a few reasons why associations apply e-learning.

### **2.2.1 Cost efficiency**

The absolutely most compelling element in embracing e-learning is the decreasing expense without a moment to spare preparing at any time and in any location. It demonstrates cost reserve funds, including decreased travel time, spared time, and

decreased classroom portions. Similarly, the instructive guidelines can be dispersed to the whole association immediately with no prerequisite of booking amphitheatres, making travel reservations, and providing convenience to a great number of mentors and learners.

### **2.2.2 Accessibility and Flexibility**

E-learning is a without-a-moment-to-spare framework which offers effective apparatuses that encourages adaptability and empowers learners to partake and finish preparations from home, work or any other place at any time. E-learning likewise permits learners to access instructive assets from both inside and outside the association on a worldwide and speedy basis. Ultimately, e-learning is an adaptable autonomous conveyance mechanism that makes conceivable the direction of conveyance from teachers to learners and is available through any PC with a basic program interface.

### **2.2.3 Diminish the cycle of conveyance time**

E-learning empowers associations to provide training and to share data with an increasing number of learners over many distant locations simultaneously. E-learning can serve seemingly unlimited numbers of students over different limits lessons reduces the cycle of conveyance time, in contrast to conventional learning techniques, which can only be presented to a limited number of learners in a specific place and at a specific time.

Since content is electronically conveyed, it can be quicker to produce, upgrade, and re-examine than if the material were conveyed along different routes – as regularly as the situation in customary classroom settings. This implies that e-learning can be an apt option in circumstances where learning content is rapidly changing, and where the essential goal is the quick, efficient dissemination of knowledge.

#### **2.2.4 Bid and association**

Many e-learning devices, for example, Blackboard, Centra, Wimba, energize understudy inspiration and coordinated efforts; they enhance group work aptitude and autonomous consideration. Moreover, they long to stay in online instructive situations. E-learning empowers designers to prepare quality learning materials through online reproduction apparatuses and revived learning objects, so it expects more from learners. E-learning additionally expands learner control through the hypertext-based presentation of data and it opens opportunities for universal, diverse, and synergistic learning. Thus, e-learning, by summoning basic considerations, thinking and objective based learning, can energize dynamic and valuable learning.

#### **2.2.5 Diminishing data over-burden**

Learners may be overpowered by the large amount of data which is offered in customary preparation; nevertheless, e-learning can sufficiently handle the consistently expanding quantity of data conveyed to learners. With e-learning, the data can be conveyed over a more drawn out timeframe and learners can acquire the data they require through different means and select that which is most appropriate to them.

#### **2.2.6 Enhancing following**

E-learning offers the capacity to track learners' exercises and have an input from the entire course. These abilities are valuable when such preparation is offered to many students over scattered regions since it is difficult to deliver course materials to every learner and track all learners' exercises and advancement in remote locations by utilizing ordinary techniques, which requires much time, effort, and resources.

Thus, e-learning, as one of the significant developments, conveys instructional substance or learning encounters electronically and makes it available from any place at any time. Hence, it is a good opportunity for associations that need to manage constantly changing data and learning needs.

### 2.3 The Obstacles of E-Learning

There are many obstacles to e-learning stated in the literature. The most important obstacles are listed below:

- The infrastructure of the Internet and communications is essential for the spread of e-learning as it is the main avenue to access any e-learning course. When good infrastructure is available, we can spread courses via the Internet at satisfactory speed. As a result, the learner will not become bored and quickly obtain as much information as they require for any course, especially when they wish to register for more than one course.
- There is a lack of experts in e-learning management because e-learning is modern and not widespread, especially in Arab countries. Therefore, there is a need to prepare experts in the field of e-learning management so they can develop the e-learning system to support traditional education.
- There is difficulty in providing maintenance for the equipment being used in e-learning systems in some areas, especially for remote or unsafe locations.
- The present officials have been used in traditional education for many years. It is difficult to persuade them to support new approaches in education to which they are unaccustomed. Therefore, it is necessary to inform and persuade them first with the importance of e-learning systems to have them support it.
- To obtain a good e-learning system, we must have a good budget, which may be high, but it is difficult to obtain official permission for a large e-learning system project.
- There is much wrong, confusing or non-factual information on the internet and designers must be very careful when providing information to learners so that learners can depend on the information. This is very important for learners' acquisition and it is important for academic integrity and its effect on the type of information.
- The shortage of teachers with sufficient training to use the Internet efficiently and improve their educational and evaluative skills.

## **2.4 Learning Management System (LMS) Models**

A *Learning Management System* is a valuable component in the e-learning exchange. It sorts, stores, and conveys e-learning course materials, which comprises only a small part of the Instructional Design. This is a crucial reason for selecting an LMS that offers the appropriate elements at the appropriate cost. In this article, we will talk about Learning Management Systems' estimating models in order to assist us to determine which arrangement is appropriate for us and our financial plan.

In the event of investigating the numerous accessible LMS choices, we would most likely officially find that the unlimited combination of components, capacities, and bolstered administrations can settle on anything other than a simple choice procedure. In any case, one of the key concerns of e-learning experts is cost. Does the LMS fit into our financial plan, and is it going to offer us the adaptability we require? In this article, we highlight the evaluation model of Learning Management Systems for both cloud and facilitated alternatives; therefore, we can limit our rundown of potential LMS arrangements.

### **2.4.1 Pay for Every Learner (Cloud-Based)**

Cloud-based Learning Management Systems do not require any product downloads. Learners can access an LMS at any time in any location dependent upon Internet access. A compensation for each learner cloud-based Learning Management System's valuing model is perfect for smaller organizations or business visionaries who are searching for a more moderate alternative, particularly individuals who have accumulated a base of people and generally know the number of learners who can access the framework. Put simply, associations pay for the quantity of learners coming to the e-learning course every month. For instance, if 400 learners register for an online course in the primary month and the administration charges 50 pennies for every client to bill would be \$200. The drawback to this is that one normally would not utilize the greater part of the components incorporated into the LMS in spite of everything required to pay for them. Likewise, if the learner base abruptly spikes, this alternative can incur great expense.

#### **2.4.2 Pay for Each Utilization (Cloud-Based)**

Every LMS supplier has their own meaning for “utilization.” In this capacity, this evaluation model is more adaptable than other models in spite of any occasional confusion. For instance, one supplier may characterize “use” as a module, while another considers it to be an online course. This is reason it is critical to check what they mean by “use” in advance, with the goal of not paying more than expected. This alternative is best for associations which do not, as a matter of course, need an extensive variety of LMS elements and which have a larger base of people. If this is the case, it is difficult to know precisely the amount to be charged as it relies upon enrollment numbers.

#### **2.4.3 Pay for Each Dynamic Learner (Cloud-Based)**

Rather than paying for each learner who is enrolled, this LMS valuing model only charges for the very dynamic learners in the online course. For instance, in the event of 500 learners being enlisted but only 300 are accessing the online course, one need not pay for those 200 latent learners. This is an extraordinary alternative for individuals lacking a reasonable evaluation of the number of learners who may effectively go to the e-learning course, or whose rates of participation vary much of the time.

#### **2.4.4 Limited Time Licensing (Cloud or Hosted)**

As opposed to paying per learner or per use, the restricted time-permitting valuing model includes a yearly fee that associations pay to use the LMS. Regardless of the number of learners enrolled in the online course, or the number of e-learning modules created, the same fee will be charged. This model can likewise, on a few occasions, be on a monthly basis. At the point when the authorizing expense time continues to rise, payment is required to reestablish it with a specific end goal in order to continue access to the online course. Ideally, this is suited for associations that have extensive learning groups of onlookers and online course libraries, or for

individuals anticipating extending quickly, as this would be a more financially wise choice.

#### **2.4.5 Perpetual Licensing Fee (Self-Hosted)**

At a point when a great many people consider introduced LMS arrangements, it is the evaluation model that springs to mind. For this situation, the association pays a one-time level charge that covers each part of the item. They download the product, host it locally, and utilize it for however long they wish. There is no expiration date, and for much of the time, updates are incorporated as a component of the arrangement. This is commonly the best choice for larger undertakings that opt to possess the product completely, as opposed to being concerned about paying yearly or monthly charges. Occasionally, the supplier may even host the LMS for an additional charge if the association does not have any desire to host it on location. In cases where one is anticipating staying with the LMS for an extended time with an unending learner base, then this might be a suitable approach.

#### **2.4.6 Free Learning Management Systems**

Finally, nevertheless and not least importantly, we have the free options. There is an assortment of learning management systems that are completely permitted to be utilized, especially those that depend on Learning Management Systems. We would normally need to be more technically knowledgeable so as to utilize these stages, yet the cost is certainly appropriate in case one is acquainted with the outline programming. Associations working with a tight spending plan and any individuals willing and prepared to maintain the framework alone, or even contract a LMS master to which to begin, may find the free model to be the best option. Nonetheless, the primary concern is that these alternatives do not bolster administrations and the upkeep costs may result in great expense. Free learning management system was selected in this study to deliver free course to the students in order to help as many students as possible.

## 2.5 Technology Acceptance Model

A technology acceptance model (TAM) is an information systems theory that models how users come to accept a new technology and how they use that technology. TAM is developed by Davis in 1989 [16]. There are two main factors that influence the decision about how and when the users will use it:

- 1. Perceived usefulness:** how a person believes that using a certain system would improve his performance.
- 2. Perceived ease of use:** how a person believes that using a certain system would be used easily.

Later improvement of TAM would incorporate behavioral intention as another variable that would be specifically affected by the perceived usefulness of a system [17]. Davis et al. (1989) proposed that there would be situations when, given a system which was perceived as useful, an individual may shape a solid behavioral intention to utilize the system without framing any mentality, in this manner offering a modified version of the TAM, shown in Figure 1.

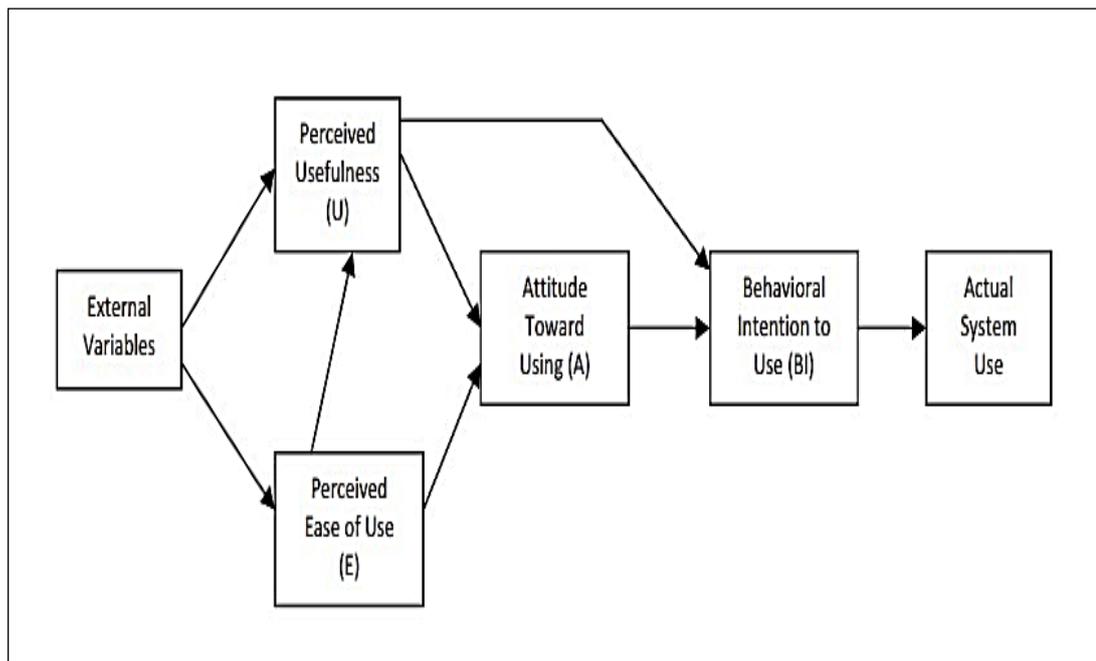


Figure 1: First modified version of TAM

Venkatesh and Davis [18] found that both perceived usefulness and perceived ease of use were found to impact behavioral intention, consequently disposing of the requirement for the attitude from the model, shown in Figure 2.

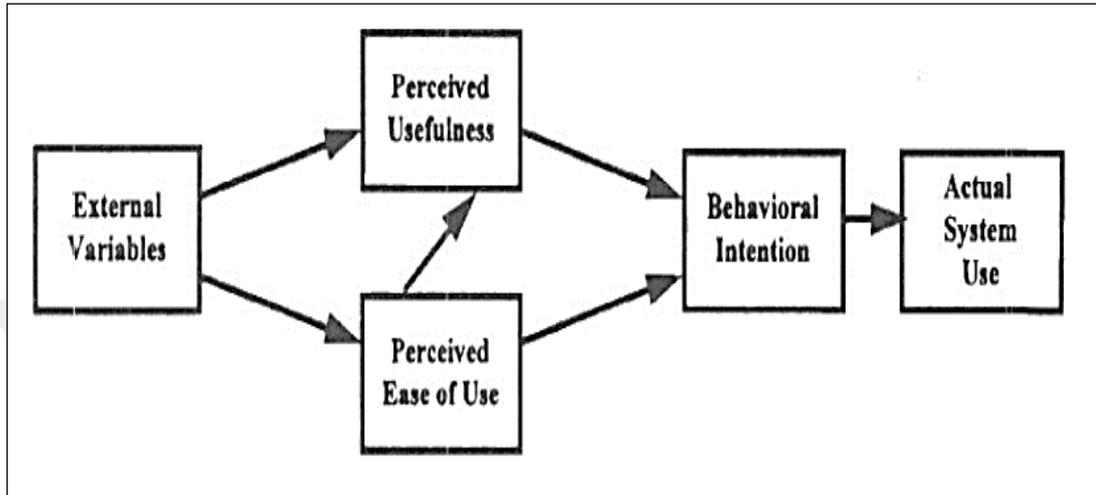


Figure 2: Another version of TAM

The TAM model attempts not only prediction, but also explanation to help researchers and practitioners identify why a certain system may be not accepted so as to take appropriate steps.

## CHAPTER 3

### METHODOLOGY

#### 3.1 Design of the Study

To evaluate the effectiveness of e-learning for Iraqi students, a descriptive research study was conducted to investigate the opinions of the students about e-learning and to uncover obstacles of implementing e-learning for Iraqi immigrant students. Descriptive research indicates the kind of research question, design, and data analysis that will be connected to a given subject. Descriptive statistics tell us what is, while deductive statistics attempt to determine cause and effect. Descriptive studies have imperative in educational research. They have expanded our knowledge about what occurs in schools. Educational researchers describe activities inside classrooms concerning the use of technology. Descriptive research can be used wrongly by those who do not comprehend its motivation and constraints. For instance, one cannot attempt to reach conclusions that show cause and effect since that is out of the bounds of the statistics employed.

The results of educational research could be grouped into four classes: description, prediction, improvement, and explanation. Descriptive research depicts regular or man-made educational phenomena that are important to policy makers and teachers. Predictions of educational phenomenon attempt to figure out if certain students are at risk and if teachers ought to utilize diverse techniques to instruct them. Improvement asks whether a certain technique does anything to help students learn better. The explanation states whether research is able to clarify a set of phenomena that leads to our ability to describe, predict, and control the phenomena with a high level of certainty and accuracy [22].

An online chemistry course for sixth grade students has been developed for this study. The duration of the study is 2 months. The immigrant students are from both Turkey and Iraq. There were 26 students and 10 teachers attending the study.

### **3.2 Procedures of the Study**

The procedures of the study are listed below:

1. Setup Course Builder (see Section 3.1 for details)
2. Develop a Chemistry course for the Course Builder platform (see Appendix A for screenshots of the online course)
3. Develop a questionnaire based on TAM to evaluate students' perceptions about e-learning (see Appendix B for details)
4. Develop a questionnaire to evaluate teachers' perceptions about e-learning (see Appendix C for details)
5. Apply the online course for 2 months at a private Iraqi school in Ankara and at a public Iraqi school in Baghdad
6. Conduct online questionnaires at the end of the implementation
7. Analyze Course Builder user statistics and students' and teachers' answers to questionnaires (see Section 3.3.1. for details)

### **3.3 Course Builder Set Up**

In this section, the explanation of the software that is needed to set up and run the *Course Builder* is presented. First Python have to be set up. *Course Builder* is written in the Python programming language. It is not necessary to know Python in order to use *Course Builder*; however, it is necessary to ensure that we have Python on our device to run *Course Builder*. Therefore, we have to install Python on our device. There are several files which are suitable for Windows, Mac and Linux. The suitable file is selected according to the operating system of our device.

Then *Course Builder* Files should be downloaded. There are several versions of *Course Builder*. We downloaded *Course Builder 1.10.0*, which is the latest version to ensure that our work is up to date. After downloading the files, there will be a folder containing several files which we will need later. Then *Google App Engine* has to be installed. *Google App Engine* (GAE) is a platform for building scalable web applications. It provides us with built-in services and APIs. Moreover, we downloaded the latest version to stay up to date.

### 3.4 Create a Project

It is necessary to have a Gmail account to create a project since we use the Google environment. We sign in to [console.cloud.google.com](https://console.cloud.google.com) with our Gmail account and select Create a Project and provide a name for the created project in order to receive an ID for the new project. The ID is very important for the next step. Moreover, it is unique for every project (See Figure 3 and 4).

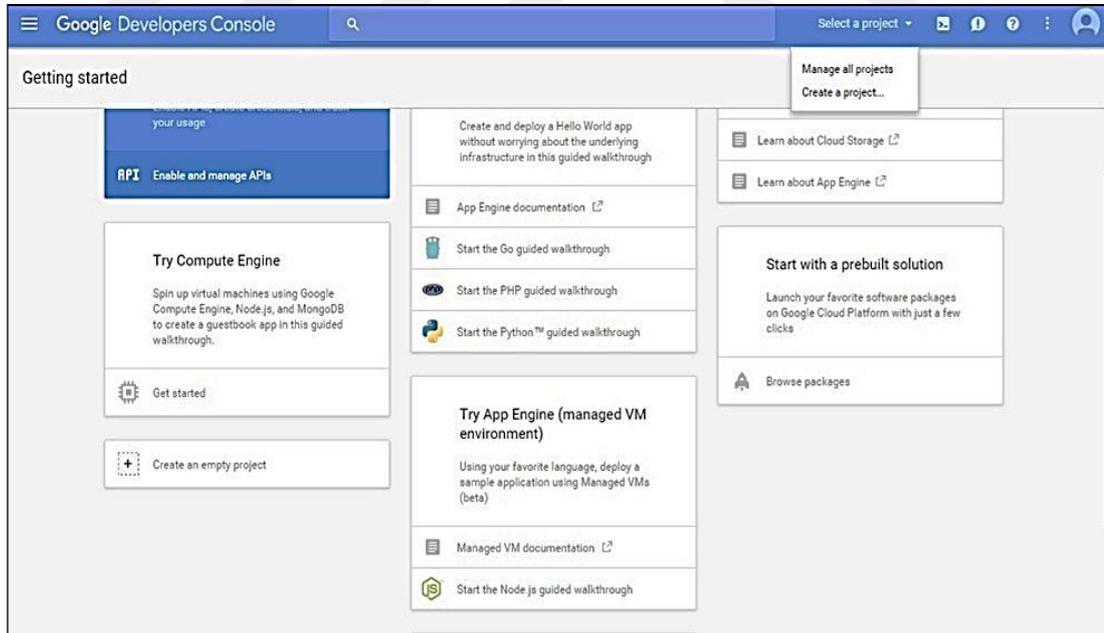


Figure 3: Screenshot of creating a project in Course Builder

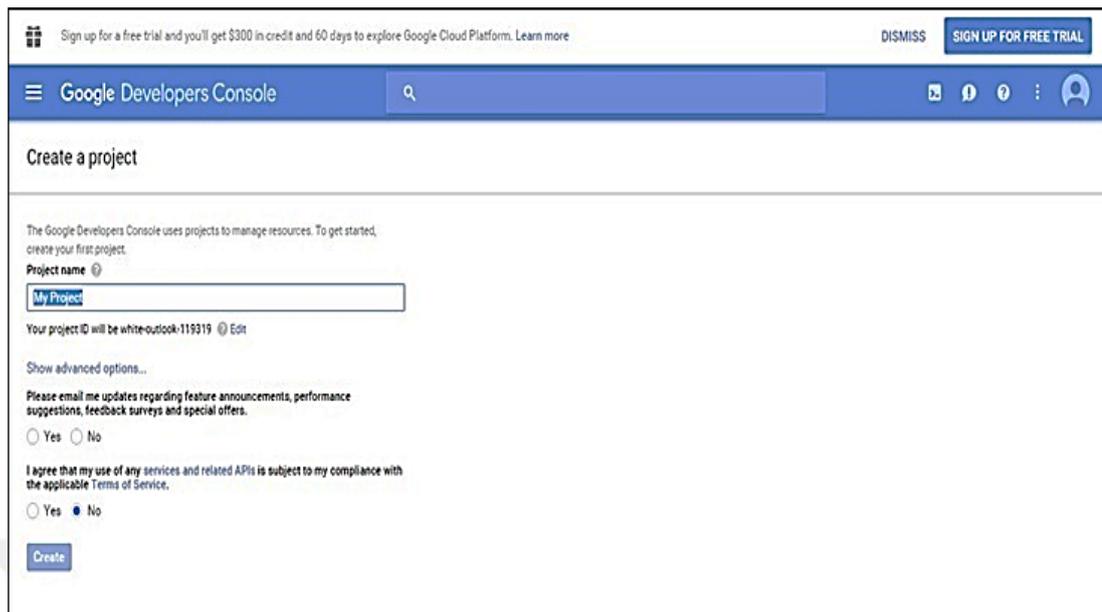


Figure 4: Screenshot of naming a project in Course Builder



Figure 5: Screenshot of starting using Course Builder

The project ID is used to update the *app.yaml* file. This file is available by default in the folder *Course Builder* which is found on our device when we download *Course Builder*. The *app.yaml* file deals with any new projects with a default project ID. We have to change this default ID and create our new project ID. We can do this by

opening the *app.yaml* file with *Notepad ++*, changing the default project ID to our project ID and saving the changes. We open the *Google App Engine* to run the project and we explore the project to manage our course. This is the final step to prepare the project and to create and add content to the course (See Figure 5).

### 3.5 Create Courses

*Course Builder* allows us to create not only one course but also multi courses within one project. Each course contains a different subject and different content. Each course should have a title that differs from the titles of other courses to make it more useful. Each course may consist of several units and lessons.

#### 3.5.1 Create a Course

From the create part, we select Create Course; when we create it, we will access its settings. With the settings, we can give the course a title that appears to the students so that they know which unit they will study and the purpose of the unit. Moreover, we can even set a logo for the course and add any text explanations or notes, videos, images, etc. using the Content Editor (See Figure 6).

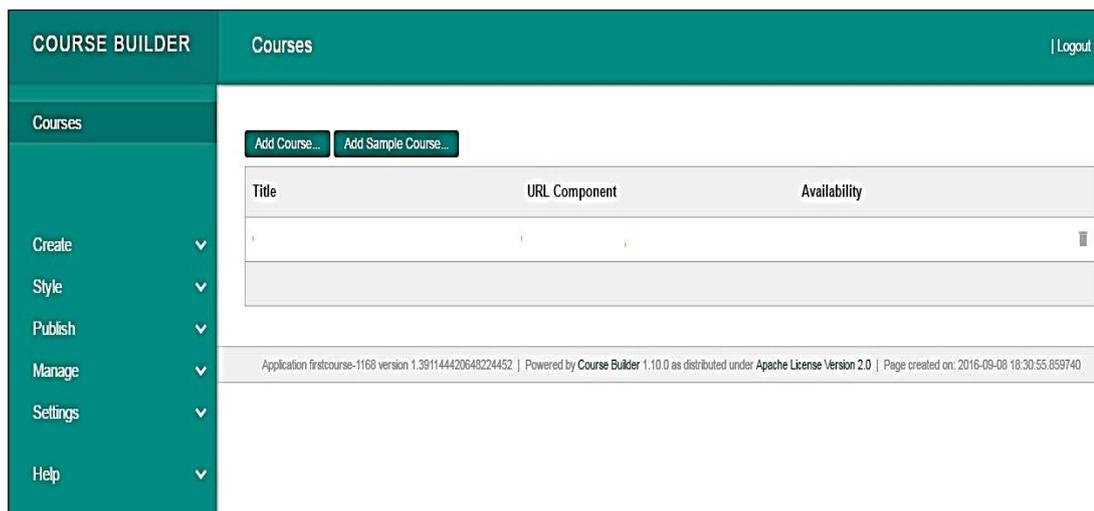
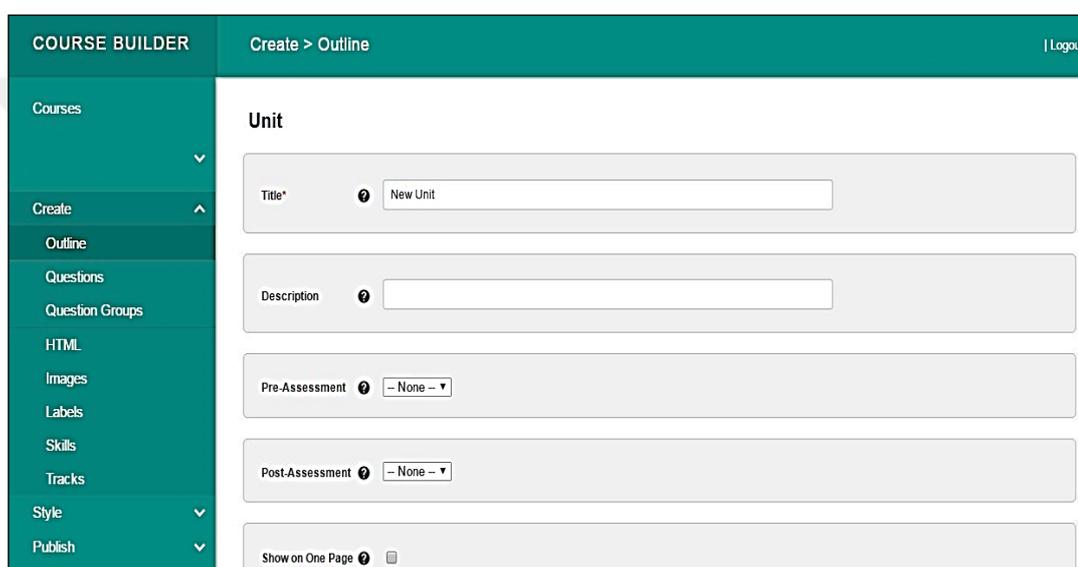


Figure 6: Screenshot of creating course in Course Builder

### 3.5.2 Create a Unit

Each course may consist of several units as the subject will consist of units. We can create a unit after we create a course; then we can access the outline and select Add Unit. After adding a unit, we have to access the unit settings to give this unit a title, which is shown to the student when he accesses the course.

The unit page may contain text explanations, videos, images, etc. using the Content Editor (See Figure 7).



The screenshot displays the 'COURSE BUILDER' interface. The top navigation bar is teal and contains 'COURSE BUILDER', 'Create > Outline', and a 'Logout' link. A teal sidebar on the left lists various course components: Courses, Create, Outline, Questions, Question Groups, HTML, Images, Labels, Skills, Tracks, Style, and Publish. The main content area is titled 'Unit' and contains several form fields: 'Title\*' with a help icon and a text input containing 'New Unit'; 'Description' with a help icon and an empty text input; 'Pre-Assessment' with a help icon and a dropdown menu set to '-- None --'; 'Post-Assessment' with a help icon and a dropdown menu set to '-- None --'; and 'Show on One Page' with a help icon and a checkbox.

Figure 7: Screenshot of creating unit in Course Builder

### 3.5.3 Create a Lesson

Each unit may consist of several lessons as needed for every unit. After we create a unit, we can create a lesson by selecting +Add lesson then we access the lesson settings to give a title to this lesson, which will be shown to the student.

Each lesson may contain a variety of content that teaches the student a part of the skills of the course. This content may be text directions, videos, images and evenly scored questions, etc. using the Content Editor (See Figure 8).

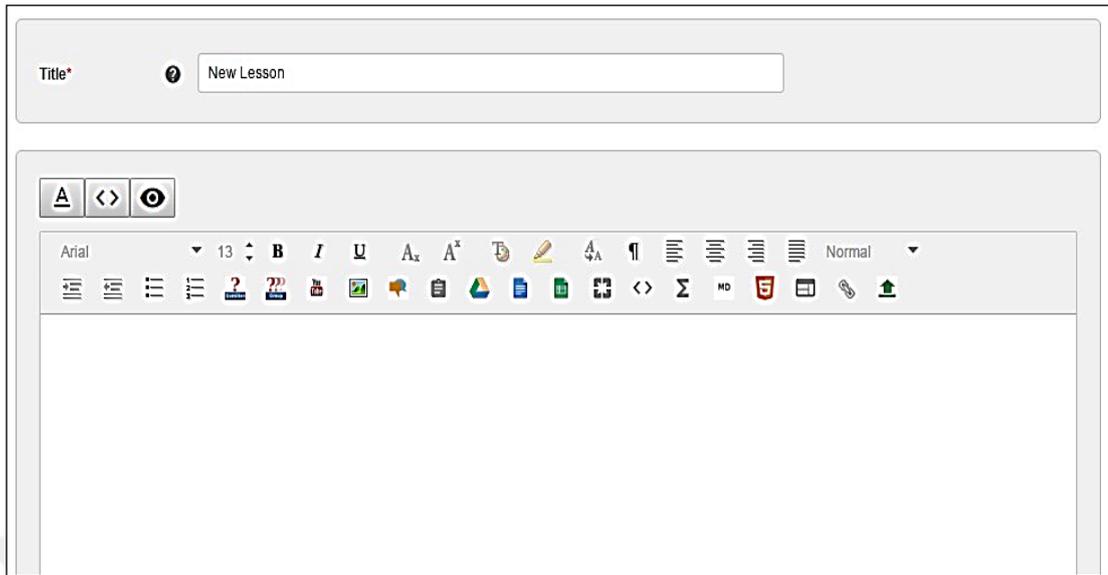


Figure 8: Screenshot of creating lesson in Course Builder

#### 3.5.4 Create Context

We can create context using the Content Editor. The Content Editor has three main buttons. The first button  is where we write text or add another type of content that appears as we insert the content. The second button  is used to view any content as an HTML file. We can edit this file and even write HTML commands when necessary, such as when we wish to create a registration form for the course.

The third button  is used to view the content as the user will. We mentioned above that each course, unit or lesson may consist of various types of content such as text, videos, images, questions, etc. This is allowed by the Content Editor, which is available in the settings of each course, unit and lesson (See Figure 9).

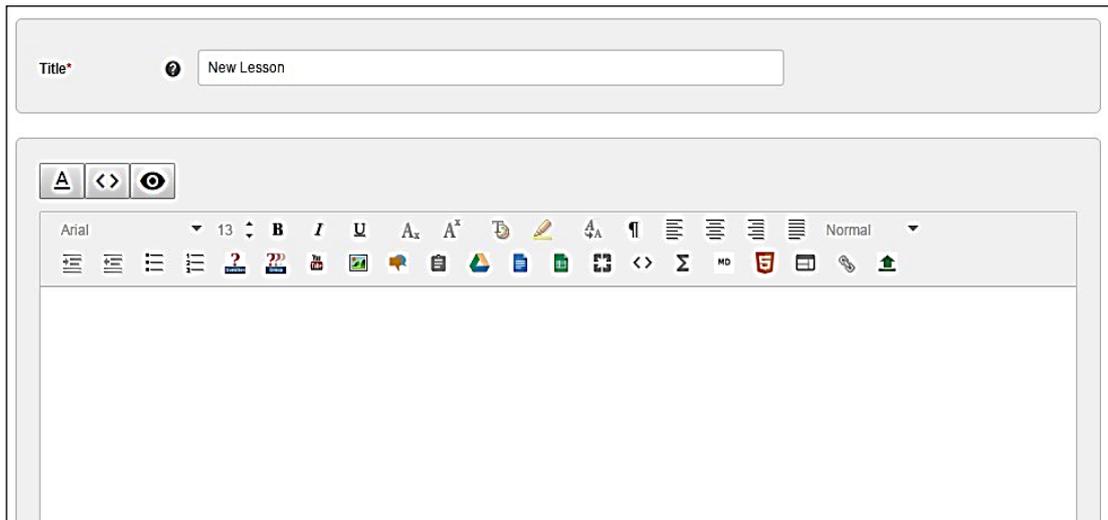


Figure 9: Screenshot of the content editor in Course Builder

#### **3.5.4.1 Add Text**

We can write text directly into the Content Editor. This text may be notes, explanations or directions, which we can edit or to which we can add effects.

#### **3.5.4.2 Adding Videos**

In the Content Editor, there is a tool that allows us to insert a video. This tool allows us to insert videos only from YouTube. We first must have the ID of the video that we want to insert. This ID is a part of the video link; we copy the ID and then paste it into the settings of the video tool and then save it.

#### **3.5.4.3 Adding an Image**

If we wish to insert an image to the content, we first have to upload it to the course's images. After uploading the desired image, the system will give a unique URL to this image. We use this URL in the settings of the image tool, which then enables us to edit the image and adjust its size.

### 3.5.4.4 Adding a Question

There is a tool for inserting questions, which allows us to insert multiple choice questions or ordinary questions. When we select this tool, we can create the multiple choice question by writing the question and giving it a score. We can then write the options and decide which option is the correct one in order to have the student select one of the options and know whether or not it is correct. With the same tool, we can create an ordinary question and have the student insert his answer and check whether or not the answer is correct. Another way to create questions is to access the Questions from the Create part of the course. Here, we can create the questions part from the Content Editor. We can create several questions and then insert one or more into the lesson by choosing Select Existing and selecting the question we wish to insert from a list of existing questions (See Figure 10).

The screenshot shows a dialog box with a close button (X) in the top right corner. At the top, there are three tabs: 'CREATE MULTIPLE CHOICE', 'CREATE SHORT ANSWER', and 'SELECT EXISTING'. The 'SELECT EXISTING' tab is selected and highlighted with a green underline. Below the tabs, there are two input fields: 'Question' with a dropdown menu showing '- Select Existing Question -' and 'Weight' with a question mark icon. At the bottom, there are two buttons: 'Save' and 'Close'. A note at the bottom left states 'Fields marked with an asterisk (\*) are required.'

Figure 10: Screenshot of creating question in *Course Builder*

## 3.6 Managing the Course

There are many things we can do it to manage the course.

### 3.6.1 Statistics

There are many statistics in *Course Builder* that are very useful to improve the entire course and for its content to be more helpful according to the needs of students.

### 3.6.1.1 Student Statistics

By managing students, we can see the number of students who are currently enrolled in the course and who still continue accessing the course. We can also see the number of students who withdraws enrollment from the course, which implies that they are not satisfied; therefore, we have to know the reasons that cause some users to leave a course in order to change or update the course or to improve the course content to enquire about the user's attention to enroll in the course. There is a number that explains the total users that have enrolled in or who have withdrawn enrollment from the course. We can also track student progress with a chart to explain students' progress throughout the course units. It is necessary to update these statistics from time to time to observe the latest student statistics (See Figure 11).

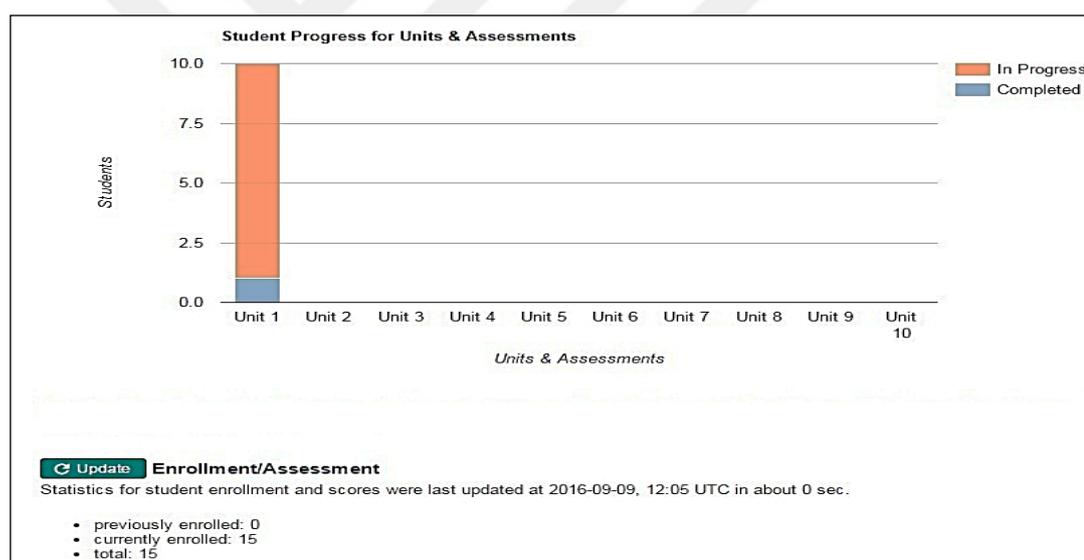


Figure 11: Screenshot of student Enrollment and their progress in *Course Builder*

### 3.6.1.2 Grade Book

We can use the grade book to compile some statistics. We can observe each answer of each student to know that whether or not the student has correctly answered every single question. This may be an indicator of each student's understanding of every lesson. As a result, we may be able to help him with further explanation. It is very useful to improve the lesson content so as to be more helpful and provide more understanding. The grade book appears in table format, which explains the units,

lessons and the answers to each student for each question and also a grade of the answer and whether or not it is correct. We can display the students' answers according to name or email (See Figure 12).

Download Scores as CSV File | Download Question Answers as CSV File

Show first response     Sort by Name  
 Show all responses     Sort by Email  
 Show latest response

Students	الفصل الاول - الترمو دالينيك																								
	وحدات الطاقة ودرجة الحرارة				بعض المصطلحات الترموديناميكية				الحرارة		قياس التثالي التفاعل		نواع الاتاليات		حساب التثالي التفاعل الفايضية										
	kalvin	ener	Subtotal	open	close	isol	Subtotal	حرارة	Excersize	اجم	ex	Subtotal	es	ex2											
Ali							0	0																	
Ali	K	1	Kg	0	0	نعم (Yes)	0	لا (No)	0	كنا (No)	1	0	410	0	24	0	<span cl...	1	40.88	0	0	1900	0	680	
ameer	K	1	J	1	0	كنا (NO)	1	نعم (Yes)	1	كنا (No)	1	0	25r	0											
Azooz	K	1	J	1	0	كنا (NO)	1	نعم (Yes)	1	كنا (No)	1	0	55c	0											
noor	C	0	J	1	0	نعم (Yes)	0	لا (No)	0	كنا (No)	1	0	2	0	22.40	0	<span cl...	0	5.22	0	0	1	0	2	
safaa jumah	K	1	J	1	0	كنا (NO)	1	نعم (Yes)	1	نعم (Yes)	0	0	100	0	25	0	<span cl...	0	2.52	0	0	16	0	موسجك	
اجند	K	1	J	1	0	كنا (NO)	1	نعم (Yes)	1	كنا (No)	1	0	25	0	-161 kJ/mol	1	<span cl...	1				0	25	0	45
محمد	C	0	J	1	0	نعم (Yes)	0	لا (No)	0			0	70 KJ	0	27.3 c	0									

Figure 12: Screenshot of creating the grade book in *Course Builder*

### 3.6.1.3 Questions

We can use manage Questions as a statistic and observe every question in every lesson and unit and know how often students attempt to answer each question. Moreover, we can see how often an answer is selected by the students. This helps to observe the students understanding of the lesson in order to answer such questions. Moreover, it improves the nature of the questions and the choices and if the choices are confused the student to choose. The questions appear in table format and explain the unit and lesson as well as the answer options and how often each option is checked (See Figure 13).

[Update All](#)

[Update](#) **Multiple Choice Question**

Statistics for question analysis were last updated at 2016-09-06, 21:51 UTC in about 2 sec.

Questions in lessons

Question Identifier ▲	Link	Average Score	Choice 1	Choice 2	Choice 3
Unit 1 Lesson 12, Question احدهم فقط صحيح	<a href="#">view</a>	0.5 (6 attempts)	2	3	1
Unit 1 Lesson 2, Question ener unit	<a href="#">view</a>	0.71 (7 attempts)	1	1	5
Unit 1 Lesson 2, Question kalvin unit	<a href="#">view</a>	0.57 (7 attempts)	0	4	3
Unit 1 Lesson 3, Question Isol sys	<a href="#">view</a>	1 (3 attempts)	0	3	
Unit 1 Lesson 3, Question close system	<a href="#">view</a>	0.75 (4 attempts)	3	1	
Unit 1 Lesson 3, Question open sys	<a href="#">view</a>	0.6 (5 attempts)	2	3	

Questions in assessments

Figure 13: Screenshot of the Multiple Question in Course Builder

### 3.6.2 Add Users

The course may be public so that anyone can access it and explore its content. Alternatively, it may be available only for registered users. We designed a registration form with which the user can use his Gmail account to register. The *Course Builder* is provided by Google and uses its environment, facilities and resources so it is not logical to use other email accounts to register for one of Google's applications. With the registration form, the user fills in the fields with information that will be used for statistics and other information. After the user fills in all the required fields in the registration form, the course will automatically send a welcome email from the instructor or the admin of the course. Then the user will be able to access all available units, lessons and questions, and he can also communicate with other students within the course in addition to the instructor (See Figure 14).

Figure 14: Screenshot of the Register form in Course Builder

### 3.6.3 Invite Users

The admin and every user of the course can invite anyone to join the course. The course requires that we go to the main page of the course, there is Progress with a link to send invitations, which takes the user to another page where he can enter a Gmail account for one or more friends to join the course (See Figure 15)

Figure 15: Screenshot of Invitation in Course Builder

## **CHAPTER 4**

### **RESULTS**

#### **4.1 Survey Results**

According to the questionnaire that we created for the students and teachers, we received 25 responses from the students and 10 responses from the teachers. The results are as presented as follows.

##### **4.1.1 Students Questionnaire Results**

The student questionnaire included 27 questions as follows.

###### **4.1.1.1 Perceived Ease of Use**

100% found that the course was easy to use (see Figure 16). 100% found that learning how to use the e-learning course was easy for them (see Figure 17). 92% found that they easily became skillful at using an e-learning course (see Figure 18). 60% found that navigating the course was easy, while 40% found that navigation of the course was odd medium difficulty (see Figure 19). 100% found that learning how to use an e-learning course was easy (see Figure 20).

All the above refer to the design of the course being simple and easy to use by the students to gain maximum benefit from the course. Due to using the course, the students found that it was easy for them to learn how to use any e-learning course and that it was not as complicated as they had thought. The students also can learn easily and acquire new skills to deal with the computer and the Internet. The course is designed in such a way that enables the student to navigate it without any

difficulty. The students, after testing and experimenting with the course, found that it was not difficult to learn how to use any e-learning course.



Figure 16: Results of perceived ease of use Question 1

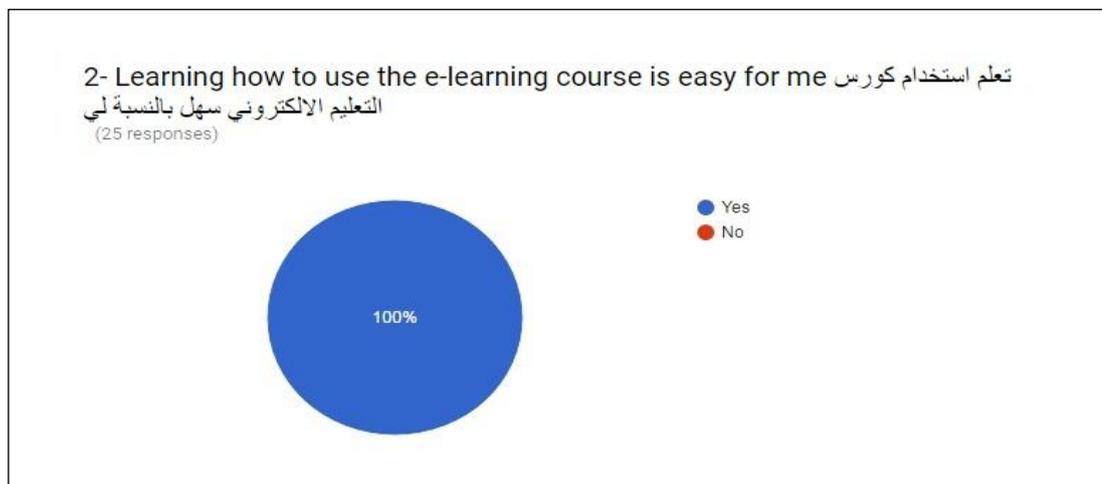


Figure 17: Results of perceived ease of use Question 2



Figure 18: Results of perceived ease of use Question 3

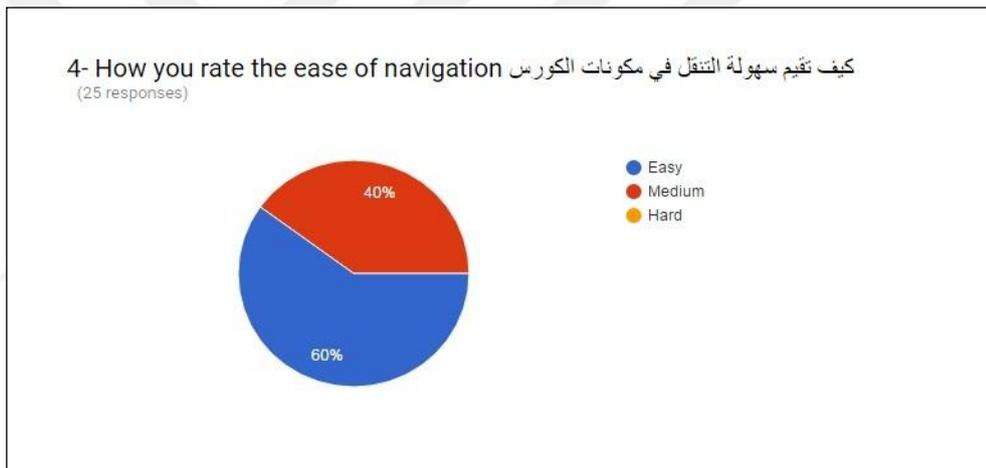


Figure 19: Results of perceived ease of use Question 4



Figure 20: Results of perceived ease of use Question 5

#### 4.1.1.2 Perceived Usefulness

100% found that an e-learning course would improve their performance (see Figure 21). 92% found that an e-learning course could make it easier to study course content (see Figure 22).



Figure 21: Results of perceived usefulness Question 6

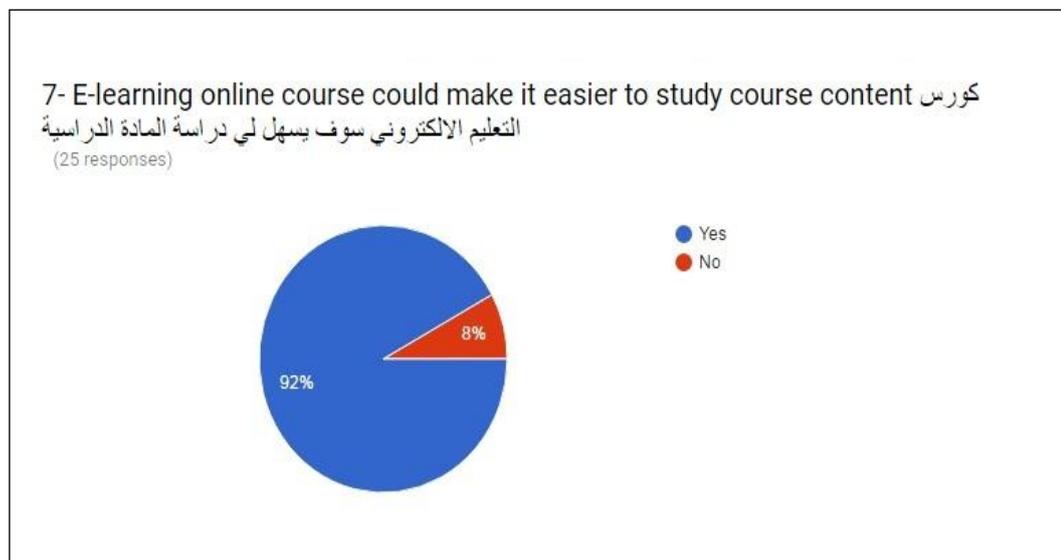


Figure 22: Results of perceived usefulness Question 7

92% found that the course content helped them to gain a clearer understanding of the course subject (see Figure 23). 82% of the students did not take any e-learning online course previously (see Figure 24).

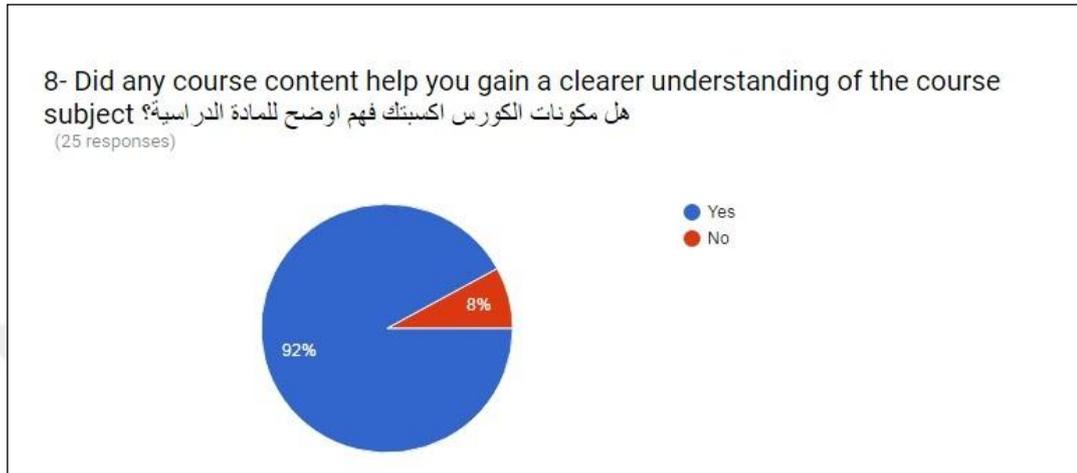


Figure 23: Results of perceived usefulness Question 8



Figure 24: Results of perceived usefulness Question 9

Therefore, with such courses, we can improve the performance of students, which is the goal of any teacher or education institute. Moreover, an e-learning online course will facilitate study and the course content in a school. Additionally, e-learning online courses will help students to have a clearer understanding of any subject that they do not understand well at school and it will help them to study the course content more easily.

### 4.1.1.3 Attitude

100% found that studying through an e-learning online course was a good idea (see Figure 25). Research question 5: Are students positive towards online an e-learning course?

96% stated that they were positive towards e-learning online courses (see Figure 26).



Figure 25: Results of perceived usefulness Question 11

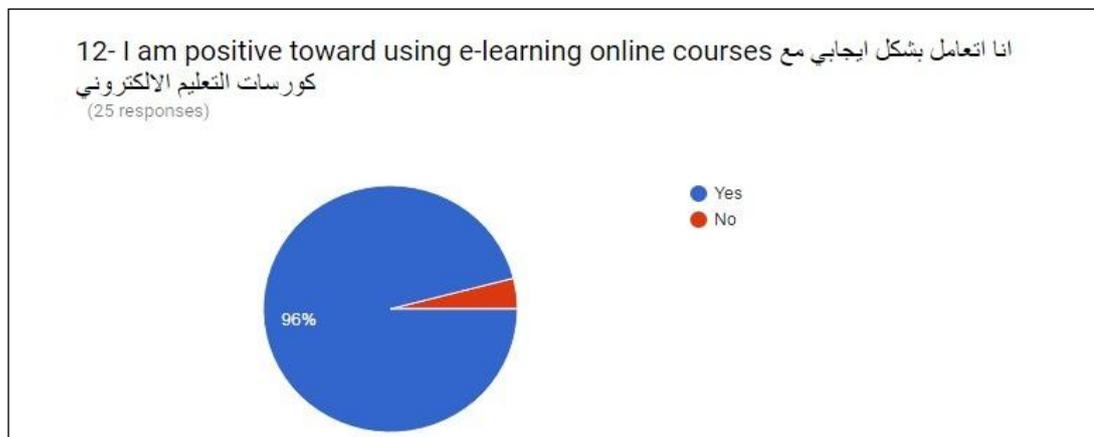


Figure 26: Results of perceived usefulness Question 12

#### 4.1.1.4 Behavior Intention

72% intended to check the announcements from the course or the instructor, which could be a new explanation or date for exams or quizzes (see Figure 27). Because of the importance of e-learning courses, 92% of the students stated that they would be heavy users of such courses (see Figure 28).



Figure 27: Results of behavior intention Question 13

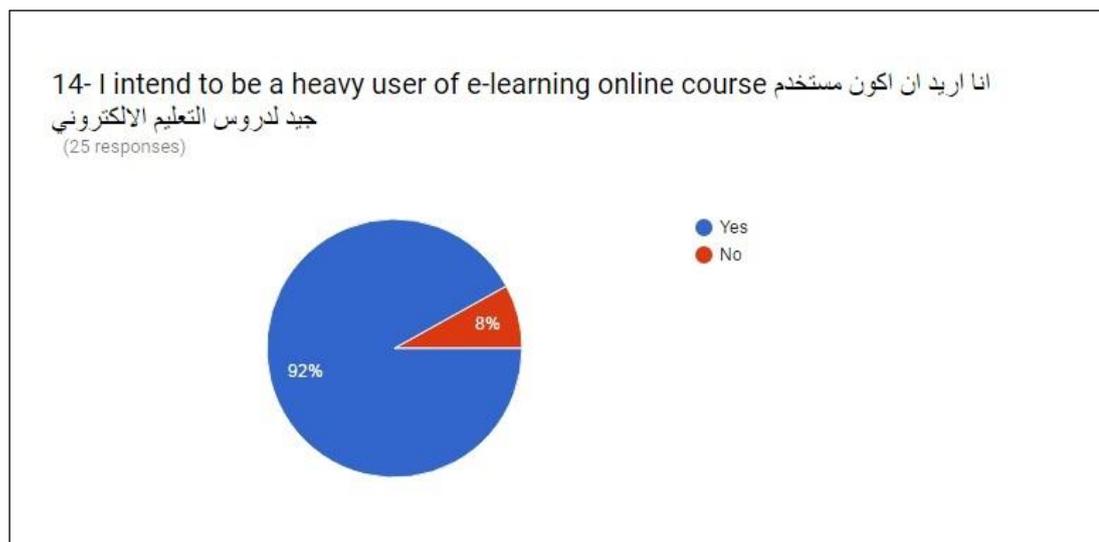


Figure 28: Results of behavior intention Question 14

The students for now did not rate highly the availability of the instructor via email or online discussions as the instructor now is not specialized in chemistry science (see Figure 29).

Moreover, they did not rate highly the interaction with the other students within the course as the study was just started and they had not taken many subjects at that time. We expect that their interaction will increase in time (see Figure 30).

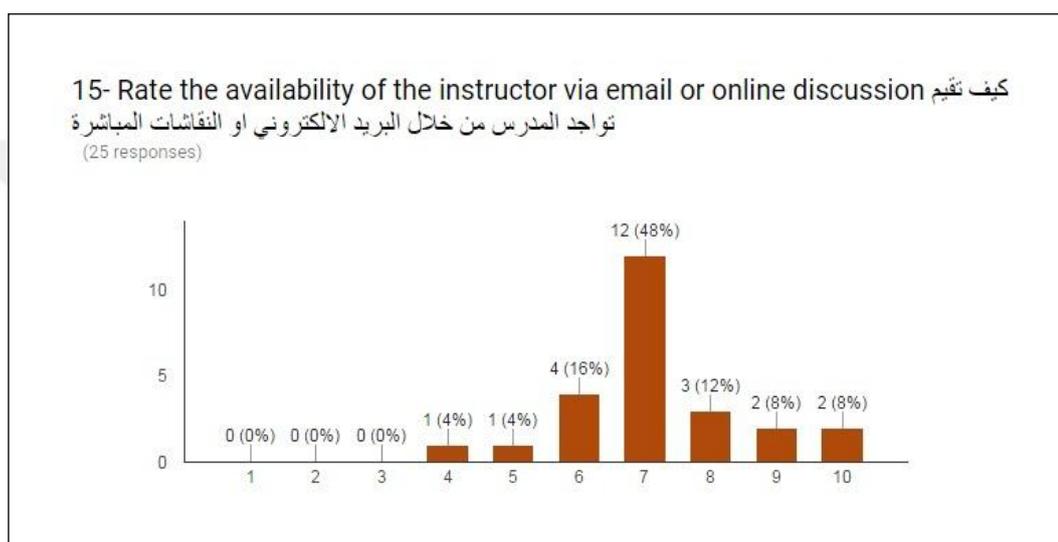


Figure 29: Results of behavior intention question 15

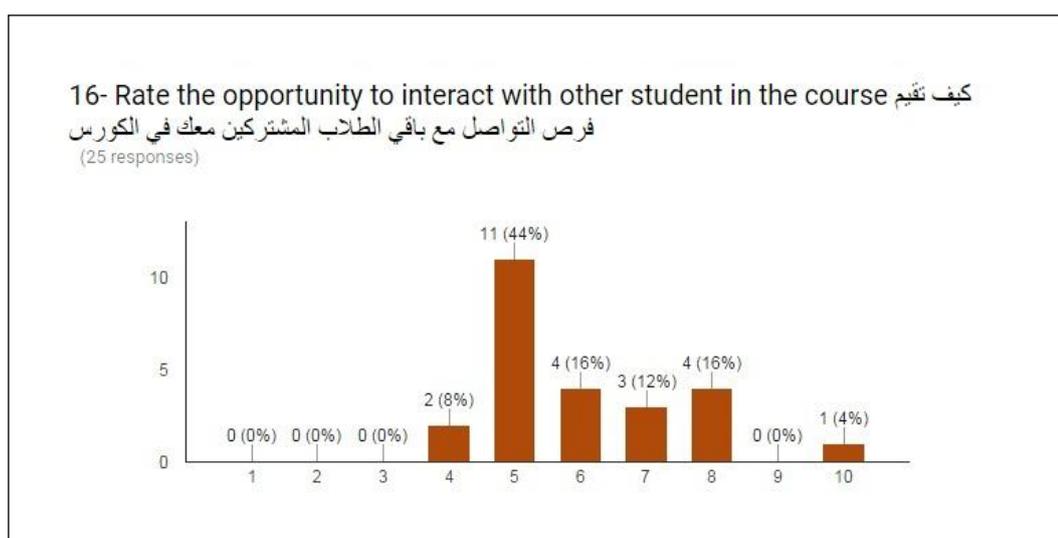


Figure 30: Results of behavior intention question 16

#### 4.1.1.5 E-learning Self-Efficacy

92% of students felt confident to find the information that they needed within the course (see Figure 31). Research Question 6: Do students have the necessary skills to use an online e-learning course?

100% found that that had the necessary skills to use the course (see Figure 32).

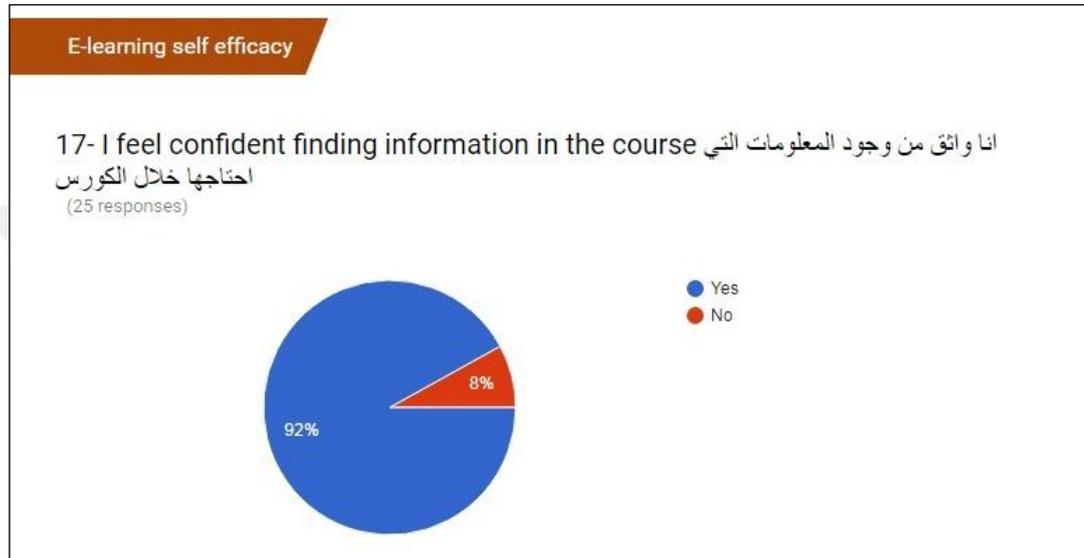


Figure 31: Result of e-learning self-efficacy Question 17



Figure 32: Results of behavior intention Question 18

The students rated highly the structure of the course (see Figure 33); they also rated highly the amount of material in the course (see Figure 34).

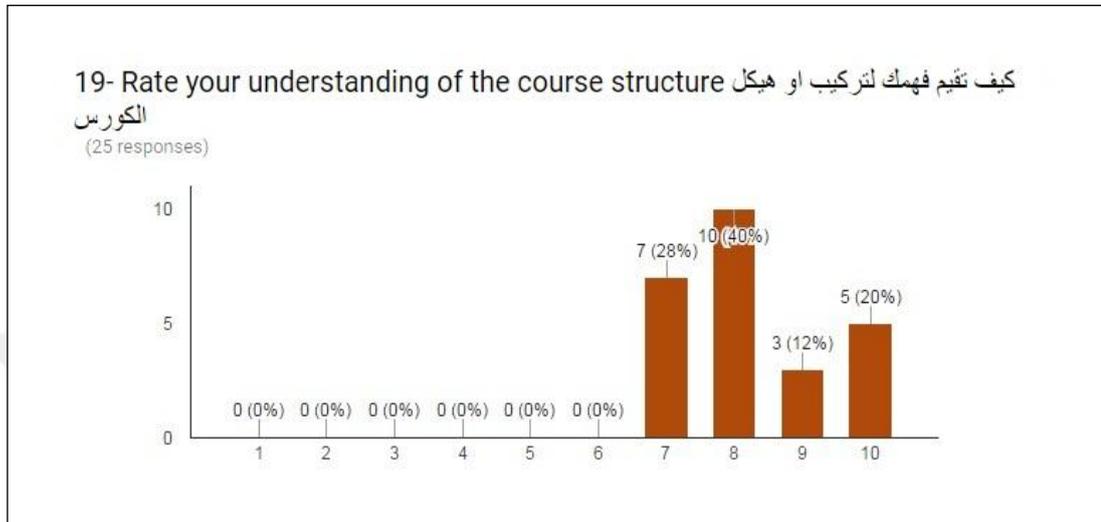


Figure 33: Results of behavior of intention Question 19

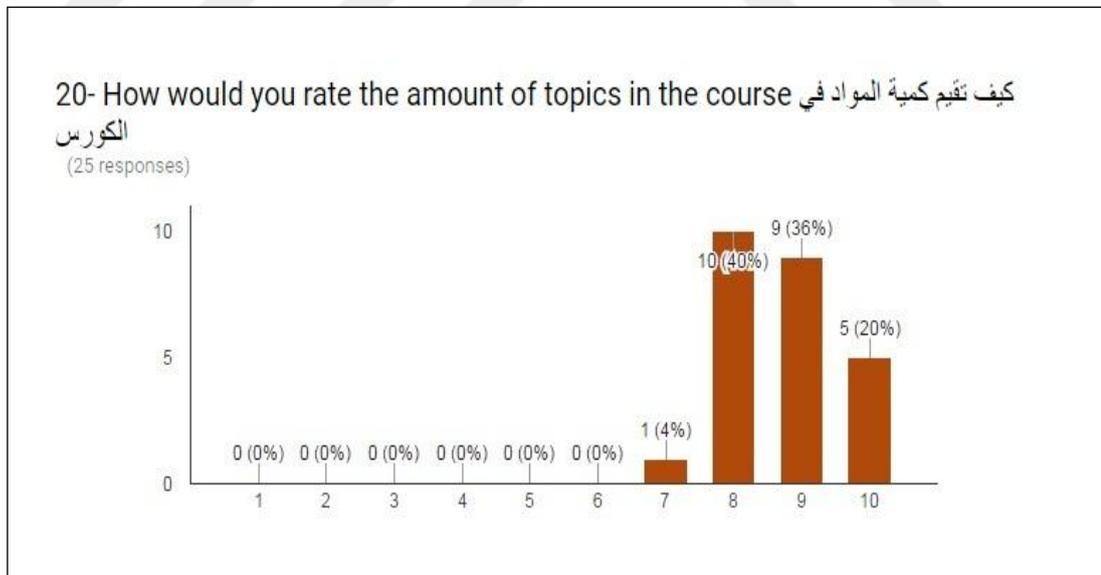


Figure 34: Results of behavior of intention Question 20

#### 4.1.1.6 Subjective Norm

100% found that the e-learning course was important to them as students (see Figure 35). 96% found that that it was important for them to take an e-learning course in order to prepare for future employment (see Figure 36).

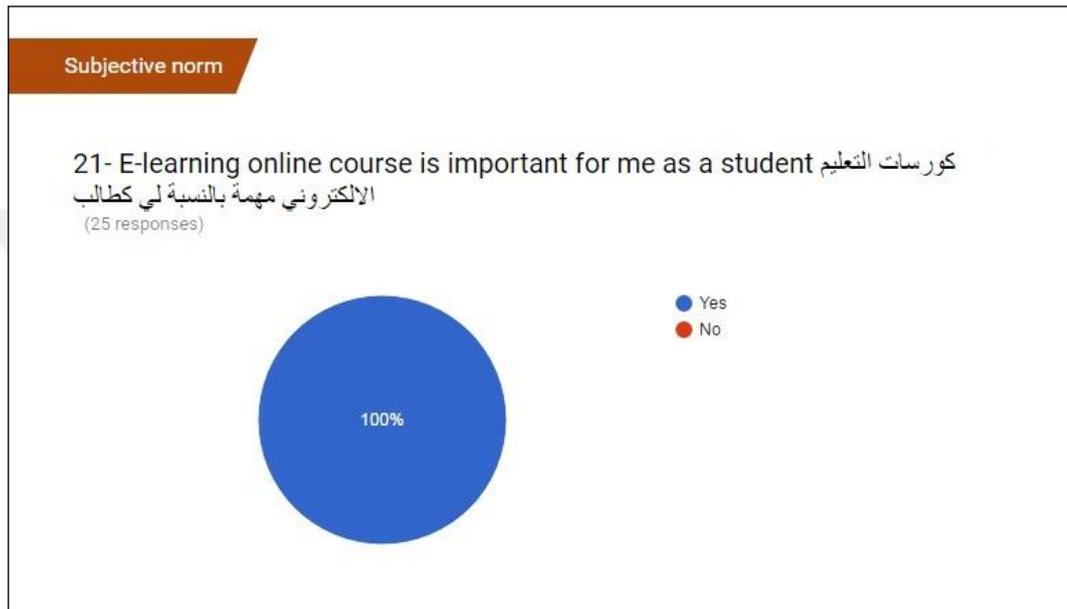


Figure 35: Result of subjective norm Question 21

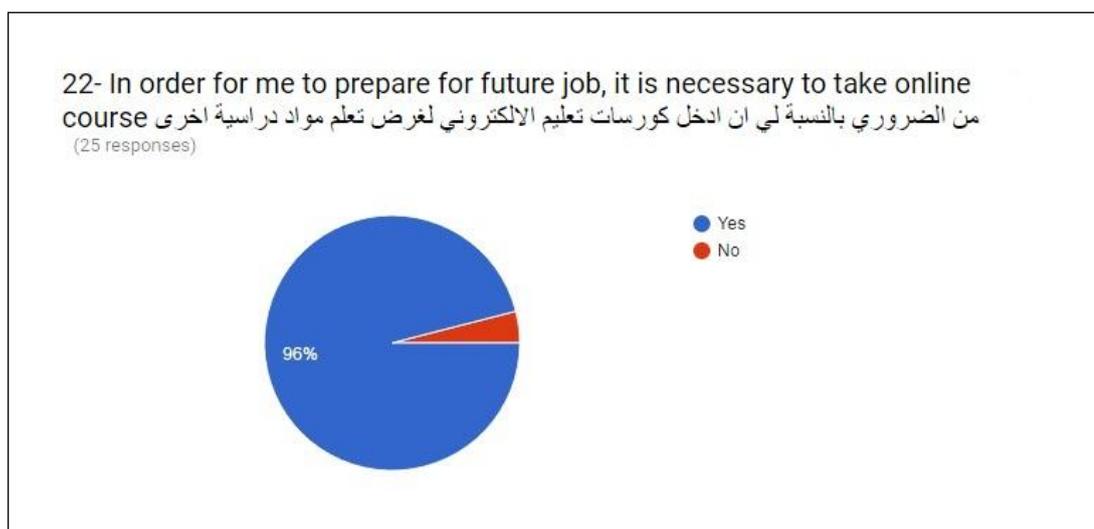


Figure 36: Result of subjective norm Question 22

100% of them stated that they would take another e-learning course (see Figure 37).



Figure 37: Result of subjective norm Question 23

#### 4.1.1.7 System Accessibility

The average time that each student spent on the course differs from one to another: 60% spent 1 hour, 36% spend 0.5 hours, while 4% spent 2 hour on the course (see Figure 38).

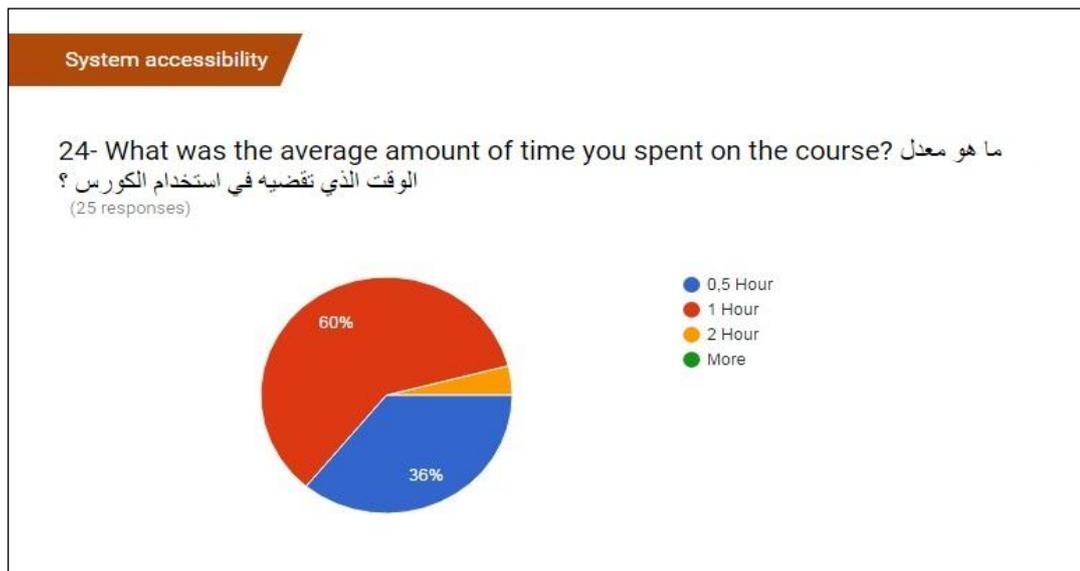


Figure 38: Result of system accessibility question 24

The course contains texts, videos, exercise and questions. 75% found that the videos were the most important components of the course content, 12% found that the texts were the most important, 12% found that the exercises were the most important, while 4% found that the questions were the most important (see Figure 39).

The students rated highly the effectiveness of the videos in the course, because it is from a good instructor and they give the lessons as same as the classrooms environment with the explanations on the blackboard (see Figure 40).

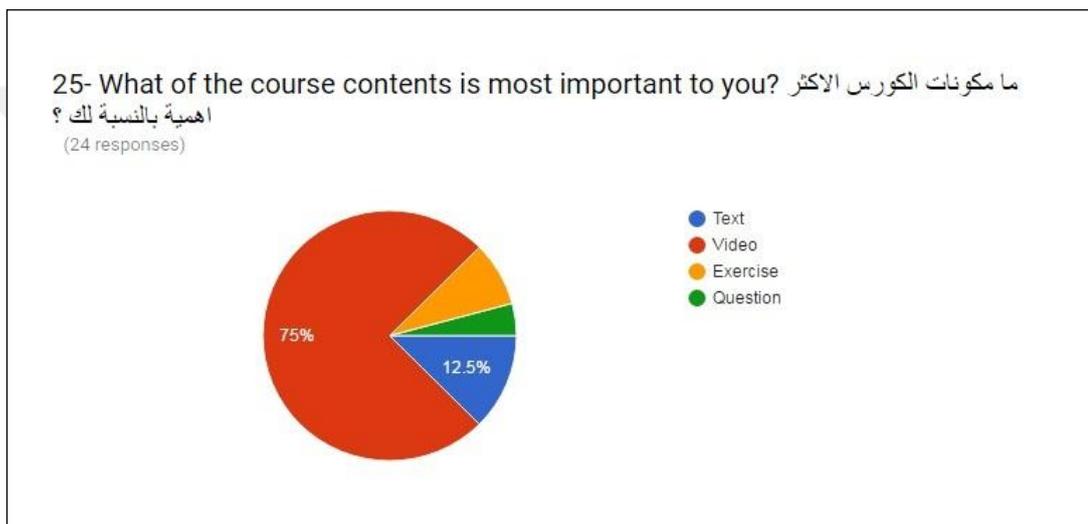


Figure 39: Result of system accessibility Question 25

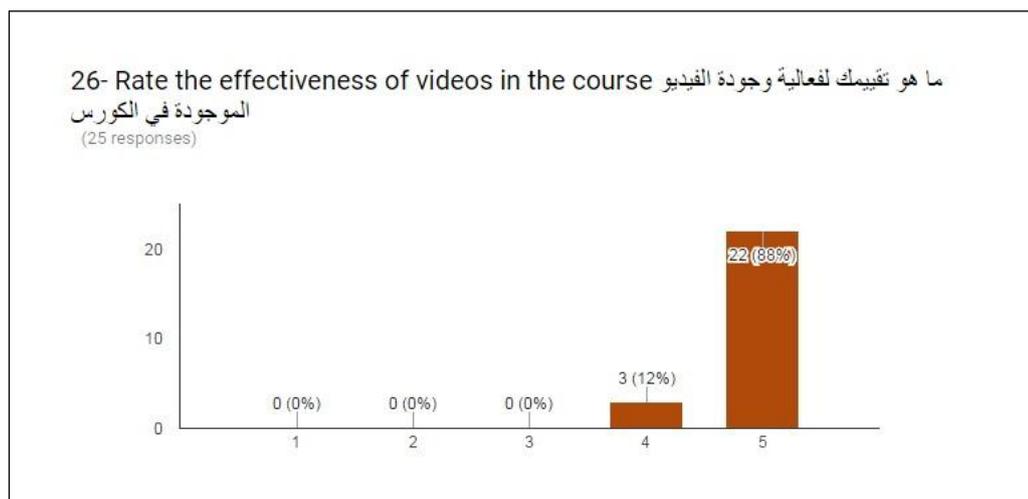


Figure 40: Result of system accessibility Question 26

Finally, the student gave a good rating to the images and their effectiveness in the course (see Figure 41).

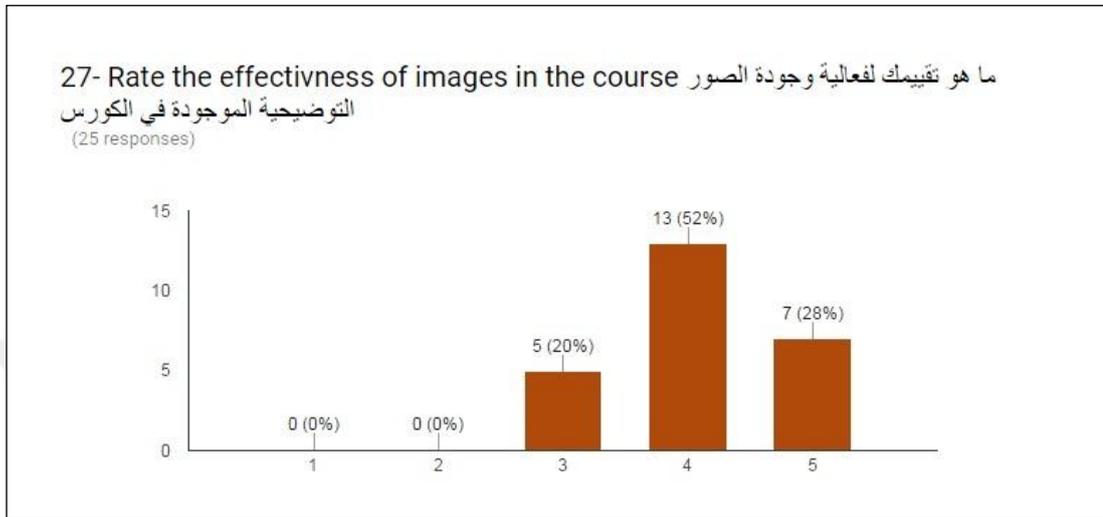


Figure 41: Result of system accessibility Question 27

Table 1 shows all students' responses to the questionnaire according to their previous experiences of e-learning. As it can be seen from the Table 1, nearly all of the participants used e-learning before.

Table 1: Students' responses according to the previous experience of e-learning

	Question	Choices	Previous experience of e-learning		Total
			First time	Used before	
1	I find the course easy to use	Yes	3	22	25
		No	0	0	
2	Learning how to use the e-learning course is easy for me	Yes	3	22	25
		No	0	0	
3	It is easy to become skillful at using an e-learning online course	Yes	1	22	25
		No	2	0	
4	How you rate the ease of navigation?	Easy	0	15	25
		Medium	3	7	
		Hard	0	0	
5	Learning How to use an e-learning online course is easy	Yes	3	22	25
		No	0	0	
6	E-learning online course would improve my learning performance	Yes	3	22	25
		No	0	0	
7	E-learning online course could make it easier to study course content	Yes	1	22	25
		No	2	0	
8	Did any course content help you gain a clearer understanding of the course subject?	Yes	1	22	25
		No	2	0	
9	E-learning online course could make it easier to study course content	Yes	1	22	25
		No	2	0	
10	Studying through e-learning online courses is a good idea	Yes	3	22	25
		No	0	0	
11	I am positive toward e-learning online courses	Yes	2	22	25
		No	1	0	
12	I intend to check announcement from the course frequently	Yes	1	17	25
		No	2	5	
13	I intend to be a heavy user of e-learning online course	Yes	1	22	25
		No	2	0	
14	Rate the availability of the instructor via email or online discussion	Scale of 10(1: lowest 10: highest)			25
		4	0	1	
		5	0	1	
		6	0	4	

	Question	Choices	Previous experience of e-learning		Total
			First time	Used before	
		7	3	9	
		8	0	3	
		9	0	2	
		10	0	2	
15	Rate the opportunity to interact with other student in the course	Scale of 10(1: lowest 10: highest)			25
		4	0	2	
		5	2	9	
		6	0	4	
		7	0	3	
		8	1	3	
		9	0	0	
		10	0	1	
16	I feel confident finding information in the course	Yes	2	22	25
		No	1	0	
17	I have the necessary skills for using an e-learning online course	Yes	3	22	25
		No	0	0	
18	Rate your understanding of the course structure	Scale of 10(1: lowest 10: highest)			25
		7	2	5	
		8	0	10	
		9	1	2	
		10	0	5	
19	How would you rate the amount of material?	Scale of 10(1: lowest 10: highest)			25
		7	0	1	
		8	1	9	
		9	0	9	
		10	2	3	
20	E-learning online course is important for me as a student	Yes	3	22	25
		No	0	0	
21	In order for me to prepare for future job, it is necessary to take online course?	Yes	2	22	25
		No	1	0	
22	Would you take another e-learning course?	Yes	3	22	25
		No	0	0	

	Question	Choices	Previous experience of e-learning		Total
			First time	Used before	
23	What was the average amount of time you spent on the course?	0.5 Hour	0	9	25
		1 Hour	3	12	
		2 Hour	0	1	
24	What of the course contents is most important to you?	Video	1	17	24
		Exercise	2	0	
		Text	0	3	
		Question	0	1	
25	Rate the effectiveness of videos in the course	Scale of 5(1: lowest 5: highest)			25
		4	2	1	
		5	1	21	
26	Rate the effectiveness of images in the course	Scale of 5(1: lowest 5: highest)			25
		3	0	5	
		4	0	13	
		5	3	4	

Table 2 shows the relationships between research questions and questionnaire items. As it can be seen from the Table 2, 8 questionnaire items are related with the first research question and 12 questionnaire items are related with the second research question.

Table 2: Relationships between Research Questions and Questionnaire Items

Research Question	Related Questionnaire Items
To what extend do Iraqi students find e-learning useful for their Chemistry learning?	6, 7, 10, 11, 17, 21, 22, 23
To what extend do Iraqi students use the online e-learning course in their Chemistry learning?	1, 2, 3, 4, 5, 8, 9, 12, 13, 14, 18, 24

#### 4.1.2 Teachers Questionnaire Results

The teachers' questionnaire included 14 questions as follows.

**Question 1.** All the teachers said that their schools does not use e-learning abroad. As shown in Figure 42.

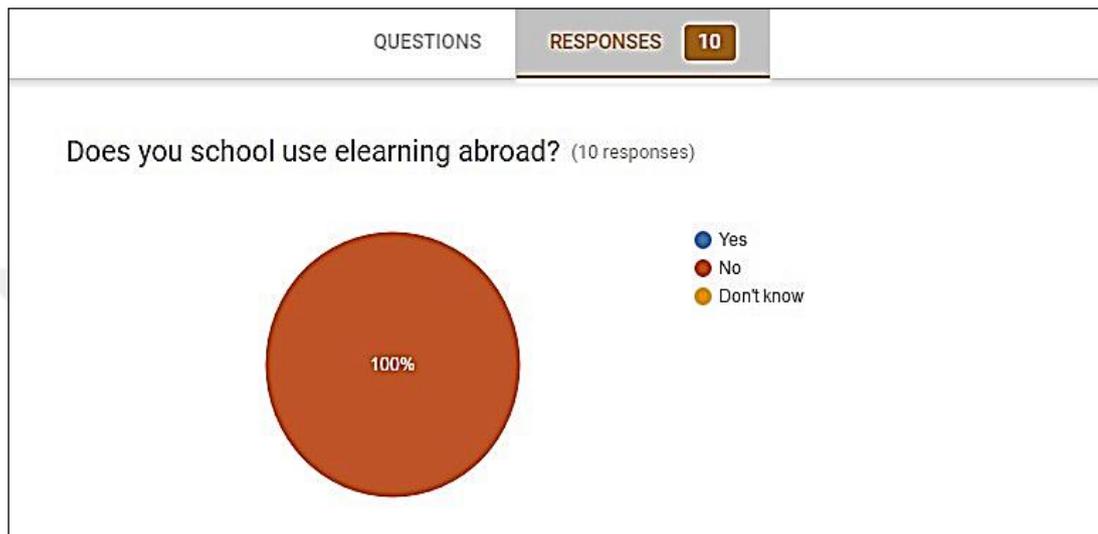


Figure 42: Result of teacher questionnaire Question 1

**Question 2.** 60% stated that the e-learning courses were a strength for their programs. 30% found that it is an opportunity for their programs, while 10% found that the e-learning courses were a problem for their programs (as shown in Figure 43).

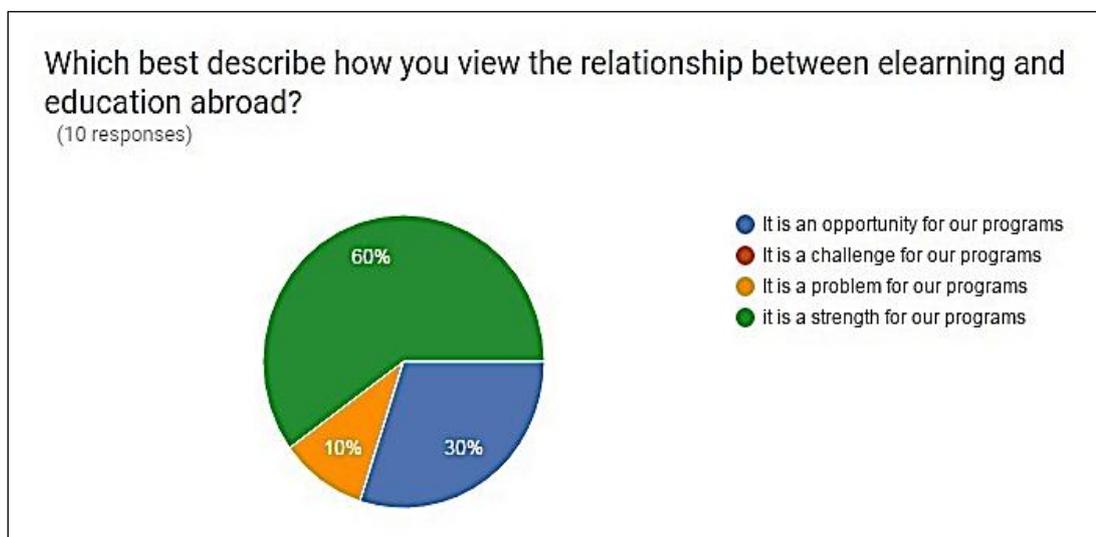


Figure 43: Result of teacher questionnaire Question 2

**Question 3.** 40% found that the students could take e-learning courses while abroad. 80% realized that the students were required to take e-learning courses while abroad, which indicates the importance of e-learning courses for the students abroad from the teacher’s point of view. 60% stated that the teachers used technology to contact their students, which is a good indication that the teachers could support e-learning courses for students abroad. On the other hand, only 20% stated that the technology was used to support learning as a formal part of the study (as shown in Figure 44).

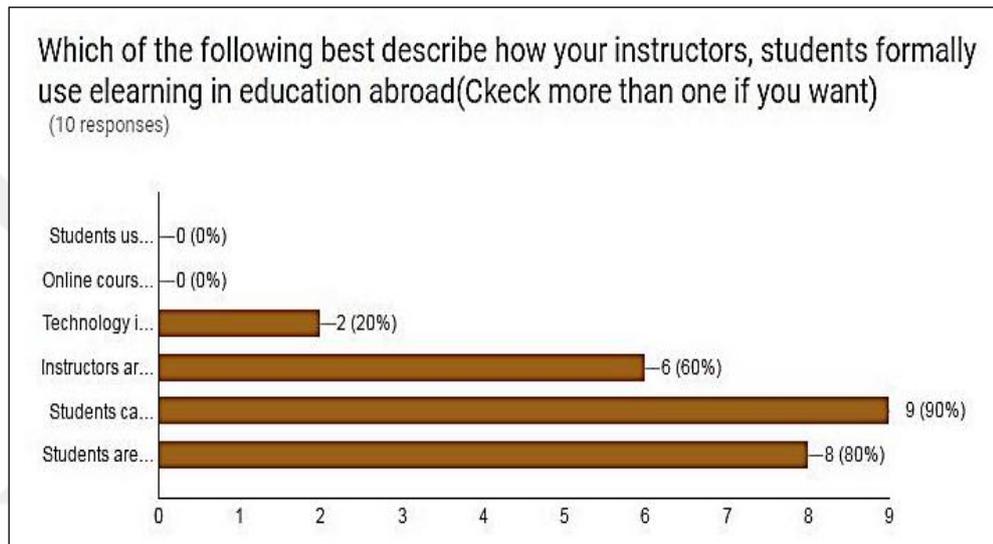


Figure 44: Result of teacher questionnaire Question 3

**Question 4.** 90% stated that the e-learning course fees should be lower than live classrooms, while 10% stated that it must be higher (as shown in Figure 45).



Figure 45: Result of teacher questionnaire Question 4

**Question 5.** 90% found that the content of the course was consistent with the objective of the subject, while 10% found that it was mostly consistent with the objectives (as shown in Figure 46).

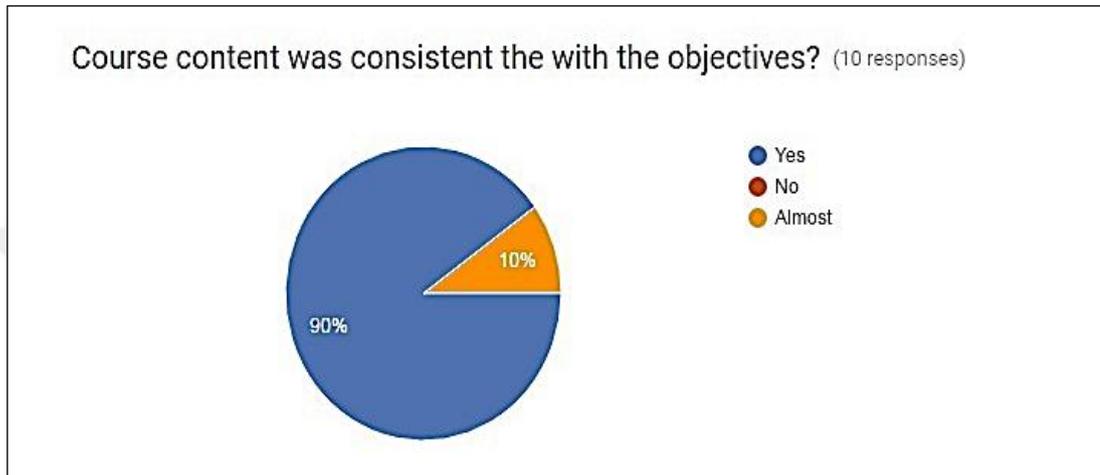


Figure 46: Result of teacher questionnaire Question 5

**Question 6.** 70% found that the content was arranged in a clear and logical way, while 30% found that it was mostly arranged in a clear and logical way (as shown in Figure 47).

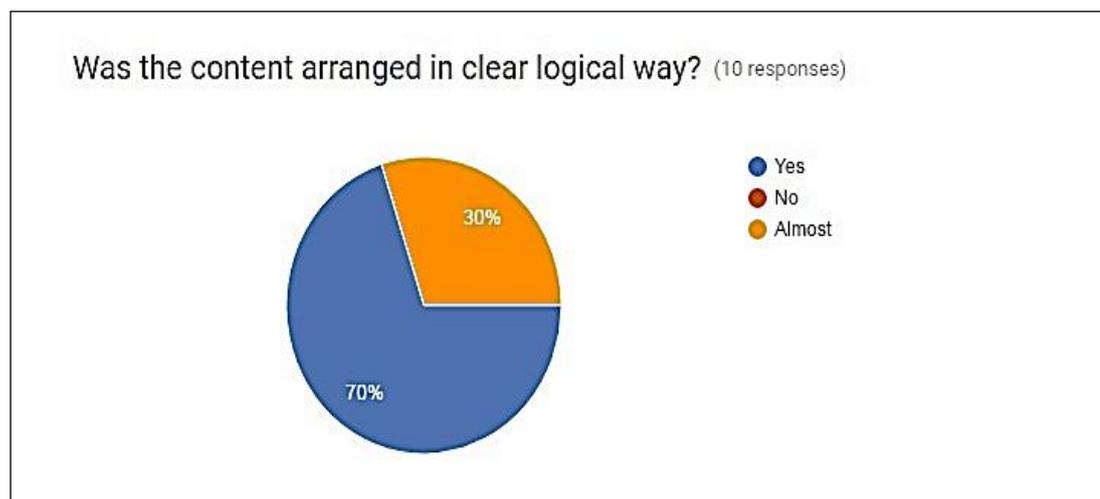


Figure 47: Result of teacher questionnaire Question 6

**Question 7.** 90% found that the content adequately explained the subject, while 10% found that the content almost adequately explained the subject (as shown in Figure 48).

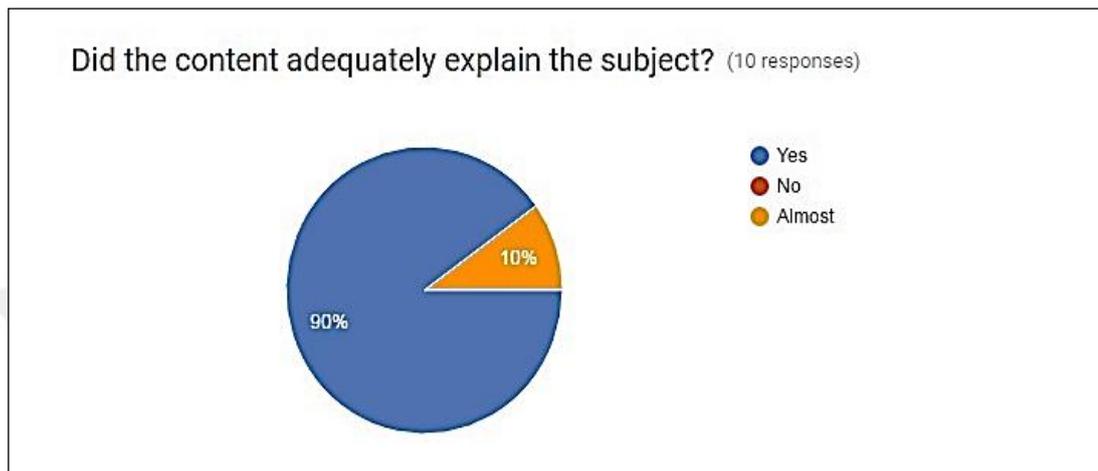


Figure 48: Result of teacher questionnaire Question 7

**Question 8.** On a scale of 10, 50% rated at 9 the amount of material covered, 30% rated it at 8, and 20% rated it at 7 (as shown in Figure 49).

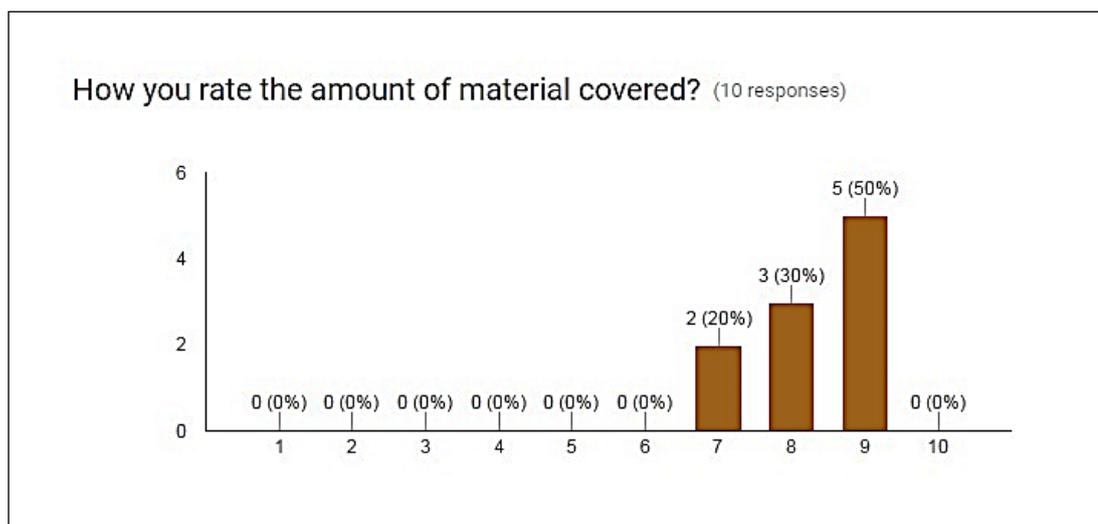


Figure 49: Result of teacher questionnaire Question 8

**Question 9.** 50% rated at 8 the quality of the examples presented in the course on a scale of 10, 30% rated it at 9, 10% rated it at 7 and at 2 (as shown in Figure 50).

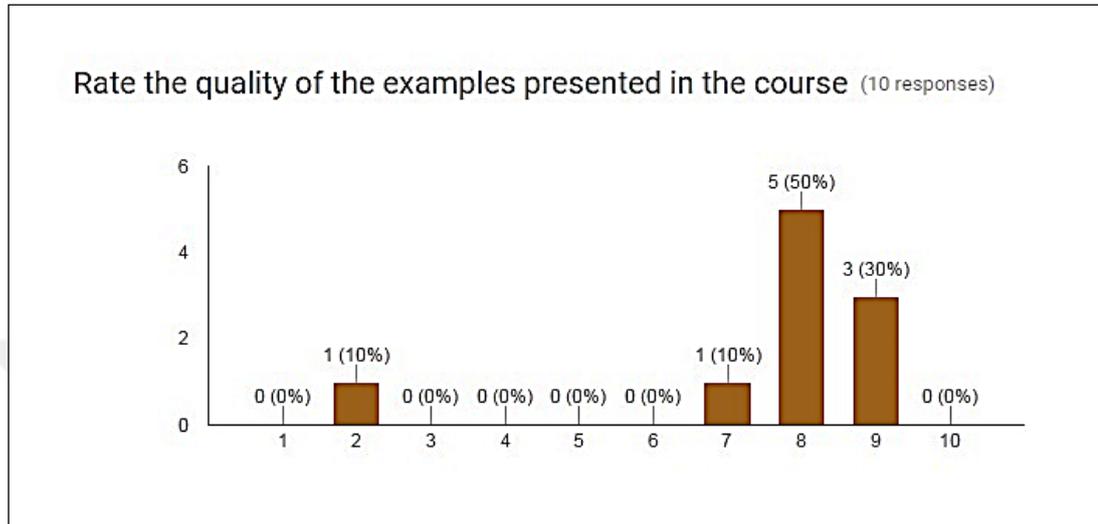


Figure 50: Result of teacher questionnaire Question 9

**Question 10.** 60% found that the quizzes were presented at adequate intervals, while 40% found that the quizzes were mostly presented at adequate intervals (as shown in Figure 51).

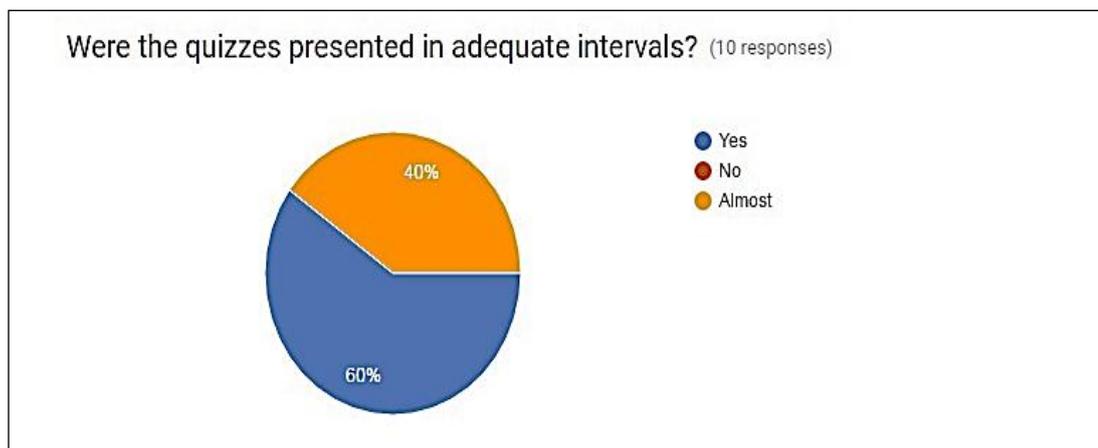


Figure 51: Result of teacher questionnaire Question 10

**Question 11.** 70% found that the quizzes presented appropriately tested the materials presented in the course, while 30% found that they almost appropriately tested the materials presented in the course (as shown in Figure 52).

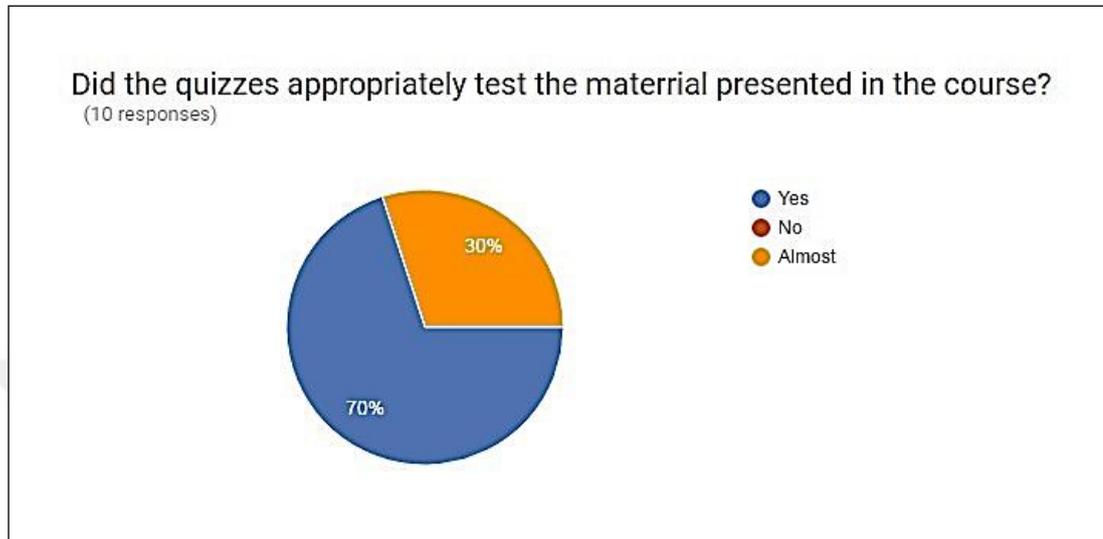


Figure 52: Result of teacher questionnaire question 11

**Question 12.** All the teachers realized that the practice questions in the course made a good learning tool (as shown in Figure 53).

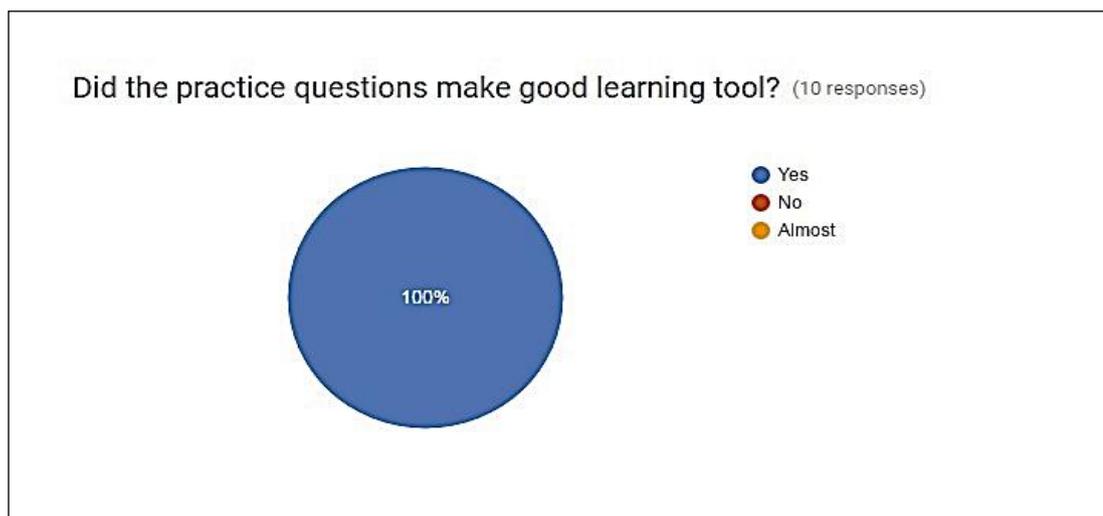


Figure 53: Result of teacher questionnaire Question 12

**Question 13.** On a scale of 10, 70% rated at 10 the effectiveness of the videos of the course, 10% rated it at 9, 8, and 2 (as shown in Figure 54).

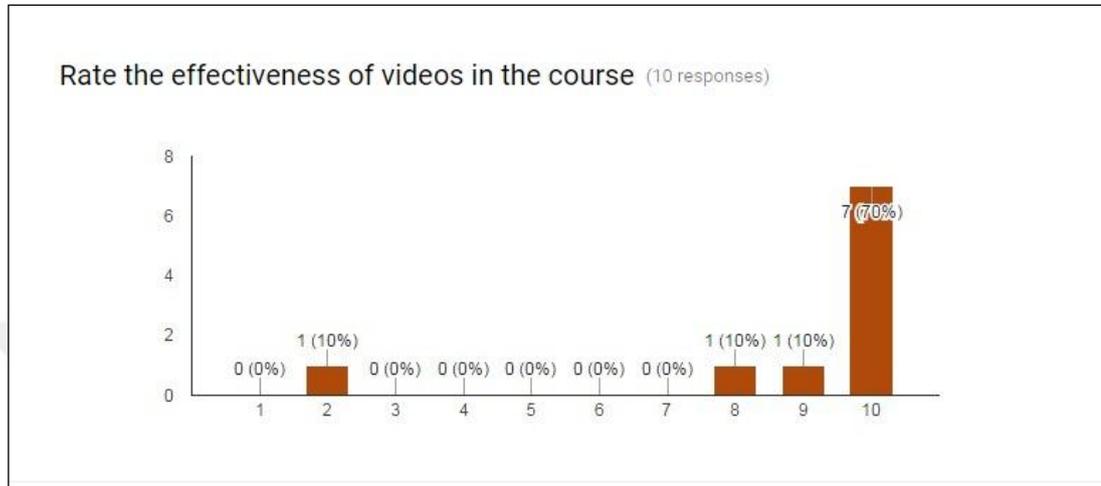


Figure 54: Result of teacher questionnaire Question 13

**Question 14.** On a scale of 10, 30% rated at 7 and 6 the effectiveness of the images in the course, 20% rated it at 9, while 1% rated it at 8 and 5 (as shown in Figure 55).

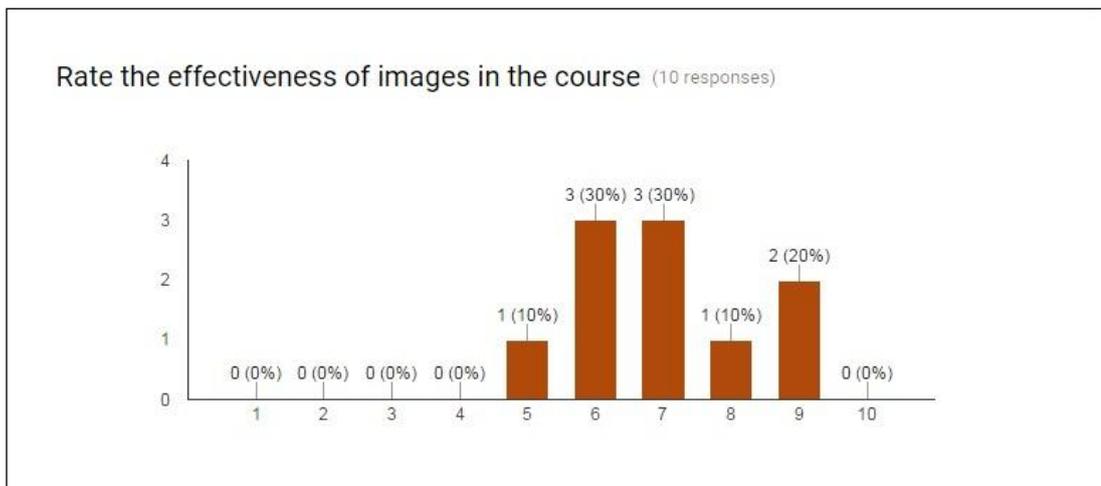


Figure 55: Result of teacher questionnaire Question 14

## **CHAPTER 5**

### **CONCLUSION AND FUTURE WORK**

The benefits of e-learning in previous studies have been diagnosed and the usefulness has been obtained in developing this study. Moreover, because this research is for high school students, it was observed that the course will be as simple as possible to use by those students, without the need for special skills to use computers or the Internet so as to guarantee that the course will be useful for the maximum number of students with consideration for what students prefer to see within a course. Videos are delivered within courses, which is mostly preferred by students, and navigation is easy between course elements. Moreover, a course provides communication with the teacher for further explanation in addition to the course providing communication between students and the discussions forum. A high percentage of students realize that courses are easy to use and that they are not required to learn new skills to use it because they have adequate skills to use the course. The majority of students find that the course will improve their performance and that it is easy to study course content. The research has the students realize the importance of e-learning such that they find the course important to them as students. They find that it is important to prepare for future employment and that it is necessary to take another online course.

Due to all the above-mentioned reasons, we searched for means to help students and their families according to the feelings of responsibility toward our country and people. Therefore, we thought to use e-learning to help as many students as we could so that they could continue their education according to the Iraqi Ministry of Education process by providing subjects and lessons identical to those which the students in Iraq take. This also reduces costs to their parents.

As a result, we created an e-learning online course in Chemistry Science with the technology that Google provides gratis, namely *Google Course Builder*, that supports education and spreads the culture of e-learning. Each student can register for the course by his Google account then he can access the course. The course consists of several units and lessons identical with the Chemistry science material for the sixth stage of the scientific branch in Iraq.

We can conclude from the responses of the student questionnaire that the students wish to deal with such courses and they have the skill to deal with them. In fact, they are even ready to learn any skill that deals with such courses if such skills are non-existent. When they start and experience the course, they find it easy to use and benefit from the information delivered by the course that is related to, and identical with, their school subject. Most students had not previously attended an online e-learning course. However, when they sampled and experienced the course, they desired to do more courses in other subjects.

It has been noticed from the results of the teachers' questionnaire that those schools not using the e-learning courses as a part of their education system depended on the traditional system as the only means of education. The teachers pointed out that expatriate Iraqi students need to, and are even required to, do e-learning courses due to the importance of this revolutionary system that supports the possibility of the students understanding a subject well.

The design of the course should be simple and easy to use by the students to gain maximum benefit from the course. Due to using the course, the students found that it was easy for them to learn how to use any e-learning course and that it was not as complicated as they had thought. The students can also learn easily and acquire new skills to deal with the computer and the Internet. The course should be designed in such a way that enables the student to navigate it without any difficulties. The students, after testing and experimenting with the course, found that it was not difficult to learn how to use any e-learning course. Therefore, with such courses, we can improve the performance of students, which is the goal of any teacher or education institute. Moreover, an e-learning online course will facilitate study and the course content in a school. Additionally, e-learning online courses will help

students to have a clearer understanding of any subject that they do not understand it well at school, and it will help them to study the course content more easily.

For future work, we seek to contact the Iraqi Ministry of Education and the Ministry of Higher Education to provide for an e-learning project using the infrastructure that Google provides for supporting the e-learning system. We aim to spread awareness of its importance in order to elevate the level of education in Iraq, which has encountered great damage to its infrastructure. We even aim to create a number of training courses for teachers to explain the importance of the e-learning system and to teach them how to create their own courses.



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## APPENDICES

### APPENDIX A

#### Screenshots of the Online Course



Figure 56: Home page of the Chemistry Course

The screenshot shows the registration form. At the top, there is a logo on the left and the word "Education" in the center. Below the logo, there are navigation links: "Announcements", "Course", "Forum", and "Registration". A search bar is located on the right side of the navigation bar. The main content area features the text "الكيمياء الكورس في مرحلة التجريب والتطوير بانتظار ارسال ارائكم ومقترحاتكم في Google Group في ال Forum اعلى هذه الصفحة".

1. What is your name?

Surname \*:

Date of Birth \*:

Email \*:

Address \*:

Note: يرجى التأكد من ان جميع المعلومات صحيحة واملأه جميع الحقول المطلوبة بعبارة \*

Figure 57: Registration Form

Syllabus	
○ الفصل الأول - الترمو ديناميك	
○ المقدمة 1	
○ وحدات الطاقة ودرجة حرارة 2	
○ بعض المصطلحات الترموديناميكية 3	
○ الحرارة 4	
○ حرارة التفاعل - التعبير في الإنتالبي 5	
○ دالة الحالة 6	
○ الخواص العامة للمواد 7	
○ الكيمياء الحرارية 8	
○ قياس الإنتالبي التفاعل 9	
○ المعادلة الكيميائية الحرارية 10	
○ تقالبي التفاعل القياسية 11	
○ أنواع الإنتالبيات 12	
○ طرائق حساب الإنتالبي التفاعل القياسية 13	
○ الميلات التلقائية 14	
○ الاتقروسي 15	
○ طاقة كينس الحرة 16	

Figure 58: The Course Syllabus

Course > الفصل الأول - الترمو ديناميك > Lesson 1

## الفصل الأول - الترمو ديناميك

- المقدمة 1
- وحدات الطاقة ودرجة حرارة 2
- بعض المصطلحات الترموديناميكية 3
- الحرارة 4
- حرارة التفاعل - التعبير في الإنتالبي 5
- دالة الحالة 6
- الخواص العامة للمواد 7
- الكيمياء الحرارية 8
- قياس الإنتالبي التفاعل 9
- المعادلة الكيميائية الحرارية 10
- تقالبي التفاعل القياسية 11
- أنواع الإنتالبيات 12
- طرائق حساب الإنتالبي التفاعل القياسية 13
- الميلات التلقائية 14
- الاتقروسي 15
- طاقة كينس الحرة 16

### الفصل الأول

### الترمو ديناميك

#### المقدمة

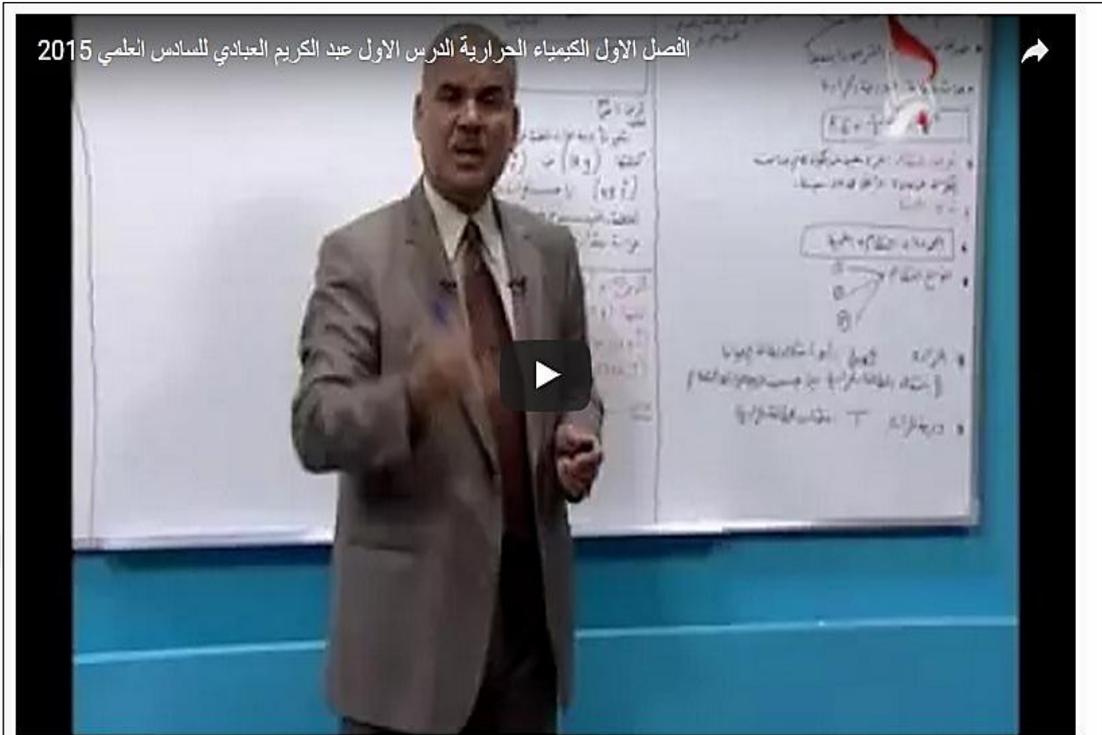
**الترمو ديناميك** علم يهتم بدراسة الطاقة وتحولاتها ويهدف نحو تحويل أكبر قدر ممكن من الطاقة الحرارية الناتجة من احتراق الوقود إلى أنواع أخرى من الطاقات مثل الطاقة الميكانيكية للاستفادة منها في عمل المحركات. يفسر علم الترموديناميك ظواهر عديدة أهمها:

- 1- سبب حدوث التفاعلات الكيميائية.
- 2- التنبؤ بحدوث التغيرات الكيميائية والفيزيائية عندما توجد مادة أو أكثر تحت ظروف معينة.
- 3- حدوث بعض التفاعلات تلقائياً وأخرى لا تحدث أبداً بشكل تلقائي عند نفس الظروف.
- 4- سبب حدوث الطاقة المصاحبة للتفاعلات الكيميائية سواء في التفاعلات نفسها أو في الوسط المحيط بها.

ومن ناحية أخرى لا يهتم علم الترموديناميك بعامل الزمن الذي يستغرقه حدوث التفاعلات، فهو يبنى فقط فيما إذا كان تفاعل معين (أو أي تغيير بصورة عامة) قابل للحدوث أو غير قابل للحدوث، دون أن يبين سرعة حدوث هذا التغيير، لأن سرعة حدوث التفاعل من اهتمام علم الحركيات الذي درسه في المرحلة الخامسة.

لذا ينص علم الترموديناميك على أن **(الطاقة لا تفنى، ولا تستحدث من العدم ولكن يمكن تحويلها من شكل إلى آخر)**

Figure 59: A Text Content



ما هي وحدات درجة الحرارة المستخدمة في التيرموديناميك؟

point 1

- M
- K
- C

ما هي الوحدات المستخدمة للتعبير عن الطاقة حسب النظام الدولي للوحدات؟

point 1

- Kg
- mole
- J

Grade Questions

Figure 60: A Video Content

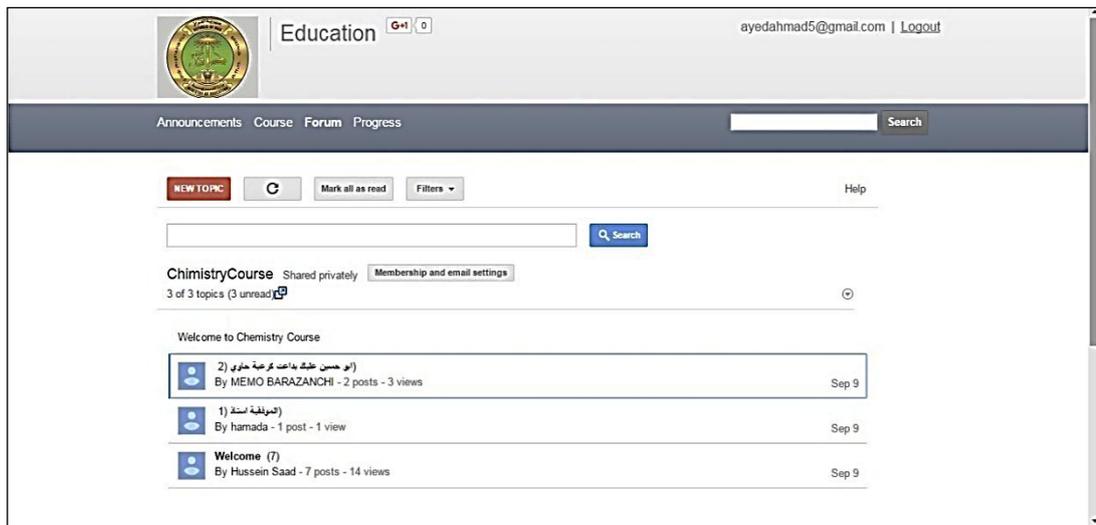


Figure 61: The Course Forum

## APPENDIX B

### The Student Questionnaire

# Chemistry Course (FOR STUDENTS)

\*Required

## Perceived ease of use

I find the course easy to use \*الكورس سهل الاستخدام \*

Yes

No

Learning how to use the elearning course is easy for me تعلم  
\* استخدام كورس التعليم الالكتروني سهل بالنسبة لي \*

Yes

No

It is easy to become skillful at using an elearning online course  
\* من السهل ان اصيح ماهرا في استخدام كورس التعليم الالكتروني \*

Yes

No

How you rate the ease of navigation \*كيف تقيم سهولة التنقل في مكونات  
الكورس \*

Easy

Medium

Hard

Learning How to use an elearning online course is easy تعلم كيفية  
\* استخدام كورس التعليم الالكتروني سهل \*

Yes

No

## Perceived usefulness

Elearning online course would improve my learning performance

\* كورس التعليم الالكتروني سوف يحسن من ادائي في التعليم والدراسة

Yes

No

Elearning online course could make it easier to study course content

\* كورس التعليم الالكتروني سوف يسهل لي دراسة المادة الدراسية

Yes

No

Did any course content help you gain a clearer understanding of the course subject

\* هل مكونات الكورس اكسبتك فهم اوضح للمادة الدراسية؟

Yes

No

Did you take any elearning online course before?

\* هل اخذت اي كورس تعليمي سابقاً؟

Yes

No

Elearning online course could make it easier to study course content

\* كورس التعليم الالكتروني سوف يسهل دراسة المواد الدراسية

Yes

No

### Attitude

Studying through elearning online courses is a good idea **الدراسة**  
\* من خلال كورس التعليم الالكتروني فكرة جيدة

- Yes  
 No

I am positive toward elearning online courses **انا اتعامل بشكل ايجابي مع**  
\* كورسات التعليم الالكتروني

- Yes  
 No

### Behavior intention

I intend to check announcement from the course frequently **انا**  
\* اريد التحقق من الاشعارات في الكورس بشكل مستمر

- Yes  
 No

I intend to be a heavy user of elearning online course **انا اريد ان اكون**  
\* مستخدم جيد لدروس التعليم الالكتروني

- Yes  
 No

Rate the availability of the instructor via email or online  
\* كيف تقيم تواجد المدرس من خلال البريد الالكتروني او النقاشات المباشرة discussion

1 2 3 4 5 6 7 8 9 10

Rate the opportunity to interact with other student in the course  
\* كيف تقيم فرص التواصل مع باقي الطلاب المشتركين معك في الكورس

1 2 3 4 5 6 7 8 9 10

## E-learning self efficacy

I feel confident finding information in the course **انا واثق من وجود**  
\* المعلومات التي احتاجها خلال الكورس

Yes

No

I have the necessary skills for using an elearning online course **انا**  
\* امتلك المهارات الضرورية لاستخدام كورس التعليم الالكتروني

Yes

No

Rate your understanding of the course structure **كيف تقيم فهمك**  
\* لتركيب او هيكل الكورس

1 2 3 4 5 6 7 8 9 10

How would you rate the amount of material **كيف تقيم كمية المواد في**  
\* الكورس

1 2 3 4 5 6 7 8 9 10

### Subjective norm

Elearning online course is important for me as a student كورسات  
\* التعليم الالكتروني مهمة بالنسبة لي كطالب

Yes

No

In order for me to prepare for future job, it is necessary to take  
online course من الضروري بالنسبة لي ان ادخل كورسات تعليم الالكتروني لغرض  
\* تعلم مواد دراسية اخرى

Yes

No

Would you take another elearning course? هل سوف تأخذ كورس تعليمي  
\* آخر؟

Yes

NO

## System accessibility

What was the average amount of time you spent on the course?

ما هو معدل الوقت الذي تقضيه في استخدام الكورس؟

- 0,5 Hour
- 1 Hour
- 2 Hour
- More

What of the course contents is most important to you? ما مكونات

الكورس الأكثر اهمية بالنسبة لك؟

- Text
- Video
- Exercise
- Question

Rate the effectiveness of videos in the course ما هو تقييمك لفعالية

وجودة الفيديو الموجودة في الكورس

1 2 3 4 5

- 
- 
- 
- 
- 

Rate the effectiveness of images in the course ما هو تقييمك لفعالية

وجودة الصور التوضيحية الموجودة في الكورس

1 2 3 4 5

- 
- 
- 
- 
-

## APPENDIX C

### The Teacher Questionnaire

# Chemistry Course (FOR TEACHERS)

\*Required

Does your school use elearning abroad? \*

- Yes
- No
- Don't know

Which best describe how you view the relationship between elearning and education abroad? \*

- It is an opportunity for our programs
- It is a challenge for our programs
- It is a problem for our programs
- It is a strength for our programs

Which of the following best describe how your instructors, students formally use elearning in education abroad (Check more than one if you want) \*

- Students use technology to access learning while abroad
- Online courses are used as part of pre-departure and re-enroll
- Technology is used to support learning as formal part of the study
- Instructors are use technology to communicate with study
- Students can take an online courses while abroad
- Students are required to take an online course while abroad

How should elearning courses fees compare to live classrooms? \*

\*

- Less
- Same
- More

Course content was consistent the with the objectives? \*

- Yes
- No
- Almost

Was the content arranged in clear logical way? \*

- Yes
- No
- Almost

Did the content adequately explain the subject? \*

- Yes
- No
- Almost

How you rate the amount of material covered? \*

1 2 3 4 5 6 7 8 9 10

- 
- 
- 
- 
- 
- 
- 
- 
- 
- 

Rate the quality of the examples presented in the course \*

1 2 3 4 5 6 7 8 9 10

- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Were the quizzes presented in adequate intervals? \*

- Yes
- No
- Almost

Did the quizzes appropriately test the material presented in the course? \*

- Yes
- No
- Almost

Did the practice questions make good learning tool? \*

- Yes
- No
- Almost

Rate the effectiveness of videos in the course \*

1 2 3 4 5 6 7 8 9 10

Rate the effectiveness of images in the course \*

1 2 3 4 5 6 7 8 9 10

**APPENDIX D**  
**CURRICULUM VITAE**

**PERSONAL INFORMATION**

Surname, Name: HAMRANY, Hussein

Date and Place of Birth: 1968 Baghdad

Phone: 05388255917

Email: h\_n\_saad@yahoo.com

**EDUCATION**

<b>Degree</b>	<b>Institution, Department</b>	<b>Year of Graduation</b>
B. Sc.	University of Technology, Department of Computer Science	1990
High School	Al-Nidal High School	1996

**WORK EXPERIENCE**

<b>Year</b>	<b>Place</b>	<b>Position</b>
2003-2004	Iraqi Commission for Computers and Informatics	Head of training department
2004-till now	Ministry of Higher Education and Scientific Research	Senior programmer