

## Return on investment for developing electronic courses at Umm Al-Qura University: A case study



Hanaa A. Yamani <sup>1</sup>, Waleed T. Elsigini <sup>2, 3, \*</sup>

<sup>1</sup>Information Science Department, College of Computer and Information Systems, Umm Al-Qura University, Mecca, Saudi Arabia

<sup>2</sup>Deanship of Information Technology and E-Learning, Umm Al-Qura University, Mecca, Saudi Arabia

<sup>3</sup>Education Technology Department, Education Faculty, Mansoura University, El-Mansours, Egypt

### ARTICLE INFO

#### Article history:

Received 10 October 2023

Received in revised form

26 January 2024

Accepted 28 January 2024

#### Keywords:

E-learning

E-courses

Return on investment

Case study

Higher education

### ABSTRACT

This study focuses on using the return-on-investment (ROI) method to assess the effectiveness of e-learning programs and projects at universities. It aims to increase the efficiency of these programs and help identify promising e-learning initiatives for the future. Research indicates that only a small percentage (8%) of educational institutions measure the ROI of their teaching programs. This particular research evaluates the ROI of an e-learning course development project at Umm Al-Qura University, conducted between 2019 and 2021 under the E-Learning and Distance Education Deanship. The methodology of the study involves descriptive analysis. This includes assessing the project's ROI, reviewing related literature, creating research tools, and performing statistical data analysis. The study found that the project had an ROI of 189.9%, meaning it produced nearly double the investment made in it. This indicates financial success, as the benefits of the project surpassed its costs. Moreover, the study highlights several indirect advantages of the project. These include increased satisfaction levels among students and faculty with the e-learning courses and enhanced learning outcomes. The project also aimed to improve the skills of students and faculty in using computers, the internet, and distance communication tools, thereby contributing to the overall institutional work system at Umm Al-Qura University.

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### 1. Introduction

With the growing interest among educational institutions, particularly universities and higher education institutions, in enhancing the quality of the educational and administrative processes and given the substantial and swift development in Internet services, various concepts such as distance learning, e-learning, and virtual universities have emerged, significantly transforming the functions of educational institutions. The focus should be on equipping learners with the skills necessary to navigate the challenges of the modern age and play a vital role in the development and modernization of their societies. These educational institutions offer various services to learners, with electronic courses

being among the most crucial (Brika et al., 2022; Khaldi et al., 2023).

The concept of an e-course refers to multimedia instructional content delivered remotely. It offers several advantages, including learner control, accessibility, availability, personalization, flexibility in the management of training time, and the ability to connect various resources in multiple formats. Resources are accessible from anywhere and at any time through e-courses. These courses also enable students to exchange knowledge with peers who share their interests (Tao et al., 2006; Yuhanna et al., 2020). Also, e-courses encounter several obstacles, such as increased teacher workload, with teachers needing to be available throughout the day to address students' inquiries and provide necessary support to them in time of need. E-courses demand 20-40% more time and effort compared to traditional courses. Converting traditional courses to digital formats has proven more challenging than many designers anticipated. E-courses are typically delivered online and may lack face-to-face communication, which can hinder social interaction (Chang, 2016; Basak et al., 2018; Yuhanna et al.,

\* Corresponding Author.

Email Address: [wtelsigini@uqu.edu.sa](mailto:wtelsigini@uqu.edu.sa) (W. T. Elsigini)

<https://doi.org/10.21833/ijaas.2024.02.013>

Corresponding author's ORCID profile:

<https://orcid.org/0000-0003-0247-7817>

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2020). Therefore, there is a need to implement an evaluation process to recognize the efficiency and the quality of e-courses and analyze the return on their production and utilization (Al-Fraihat et al., 2020).

Dewi and Kartowagiran (2018) noted that there had been several attempts to apply evaluation models from other fields, such as business, to the academic context. In higher education, one of the most well-known models adopted for e-learning evaluation is Kirkpatrick's (1976) model, primarily based on ROI in e-learning. This model contains four dimensions:

1. Reaction: This level focuses on measuring the participant's satisfaction with the e-learning program. An academic e-learning program offered by the university is considered successful if the participants exhibit a high level of satisfaction, which in return motivates them to learn.
2. Learning: This level deals with the attitudes, knowledge, and skills that have been strengthened or improved.
3. Behavior: This level assesses the extent to which participants in the e-learning program apply the acquired skills.
4. Result: This level focuses on the benefits accrued at the level of the educational institution as a result of training and education (Kirkpatrick, 1976; Bates, 2004; Yardley and Dornan, 2012; Dewi and Kartowagiran, 2018; Cahapay, 2021).

Phillips (2002) introduced a five-stage extension to the Kirkpatrick model called ROI, which involves comparing the monetary value to the cost of the training. Many American and British organizations use the Kirkpatrick-Phillips five-level training evaluation model to define and measure the effectiveness of their training program outcomes (Medina et al., 2015). Rosenberg (2001) largely agreed with the Kirkpatrick model, highlighting the significance of quantifying benefits for the ROI calculation. These benefits can be evaluated based on various criteria, such as:

1. Cost: Reduced costs associated with face-to-face classes, such as room rental and travel costs, as well as the preservation of physical teaching resources. Additionally, there is potential for selling revenues.
2. Quality: This encompasses an improved institutional reputation, increased student satisfaction, and higher retention rates.
3. Service: It relates to improved learning experiences, increased access to education, and higher enrollment rates.
4. Speed: This involves enhanced delivery through greater flexibility, improved adaptability, and the regular updating of course materials.

In general, Jasson and Govender (2017) noted that the decision regarding ROI calculation hinges on the answer to a fundamental question: Do the

benefits exceed the costs of training? Utilizing the ROI approach in e-learning evaluation at universities can lead to increased budget allocation for educational matters, thereby promoting the efficient operation of academic programs. This approach can also help identify potential future initiatives for e-learning (Nichols, 2004). Dziechciarz (2016) emphasized the significance of measuring ROI for e-learning programs and courses. This evaluation helps in assessing the value of the resources allocated to e-learning development, ultimately aiding in decisions regarding the feasibility of continuing and expanding these programs or reverting to previous approaches.

This case presents a challenge for decision-makers because the benefits of e-learning are not always easily measurable. There are various methods to gauge the return on investment (ROI) in e-learning, such as evaluating learners, tracking the connection between learning outcomes and performance, and assessing the impact on the work outcomes of institutions that offer this type of program.

Rosenberg (2001) also noted that the cost category is the only one that can serve as a stable foundation for quantification, acknowledging that not all institutions may be willing to consider selling their e-learning materials. Despite the significance of the ROI approach in e-learning evaluation, the Emerald Works report indicates that only 8% of education and training institutions actually calculate the ROI for their educational programs. This suggests that fewer than 1 in 10 educational institutions measure the ROI for their educational and training programs.

Jasson and Govender (2017) noted that less than 10% of what is learned in training courses is effectively applied in the workplace to improve performance and business outcomes. Moreover, less than 15% of organizations measured the impact of training on organizational results, encompassing business and financial outcomes (Mattson, 2000). In the realm of instructional program evaluation, assessments of efficiency and effectiveness often stop short, typically limited to surveys that measure participant satisfaction and self-esteem within the existing business context (Dziechciarz, 2016).

From the preceding information, it is evident that despite the significance of examining the ROI for e-learning programs, there exists a shortage of opportunities for implementing this approach within educational institutions. Therefore, this research endeavors to evaluate the ROI for the electronic course development project undertaken at Umm Al-Qura University between 2019 and 2021, under the supervision of the Deanship of E-Learning and Distance Education, adhering to defined and well-established standards, presented as a case study. This project aimed to develop 60 e-courses in collaboration with various colleges and institutes at Umm Al-Qura University under the supervision of the Deanship of E-Learning and Distance Education. Consequently, the following research question is:

What is the ROI for the electronic course development project conducted at Umm Al-Qura University from 2019 to 2022?

## 2. Literature reviews and conceptual framework

Assessing the ROI through the evaluation of e-learning programs and the development of e-courses stands as one of the foremost approaches in appraising this instructional modality. ROI is regarded as one of the most important indicators that decision-makers in educational institutions rely upon to assess the quality of e-learning programs and determine whether to continue offering this type of program or not. In light of that, the following items will be addressed.

### 2.1. ROI: Concept and benefits

ROI can be defined as a form of cost-benefit analysis that compares the costs of a program with the financial return it generates. ROI is an economic indicator used to quantify the economic benefits gained from a project or program relative to its costs. ROI serves as a key performance indicator (KPI) for determining the profitability of investments. It quantifies the return on a particular investment and is applicable across various types of institutions. Therefore, in this research, the researchers define the ROI as a KPI for analyzing the program's costs in comparison to the financial return it yields. There are some benefits to measuring the ROI at any institute and for any program or project.

Easy to calculate: Only two figures are required—the benefit and the cost. It helps understand the profitability by determining the profit or loss earned from your investment. A useful tool for evaluating the profitability of an investment or project. Provide a clear vision for long-term business planning: Offer indicators of strengths and areas for improvement to enhance business growth more effectively. Provides a standardized measure for comparing the efficiency of various investments. The ROI calculation includes the net return in the numerator, considering both the initial investment and the final investment value.

At universities and instructional institutions, employing ROI for e-learning evaluation enhances education budget allocation, ensuring optimal efficiency in academic program operations.

Determine the value and justification of the resources invested in e-learning development. Provide a clear vision for decision-makers on the feasibility of program continuation and expansion, along with proposed future e-learning initiatives aimed at enhancing productivity, reducing errors, and achieving cost savings.

### 2.2. Measuring ROI of e-learning

The calculation of ROI in e-learning involves a series of essential steps, commencing with goal setting and alignment (Phillips, 2002). This initial

step involves measuring ROI for e-learning initiatives and projects, ensuring they align with system objectives and maintain compatibility with overall organizational goals. This step establishes a strategic link between e-learning initiatives and organizational goals, aligning with the organization's vision and performance indicators. Moreover, it involves identifying the desired learning outcomes and performance indicators that the organization will use to evaluate the effectiveness of e-learning programs and initiatives (Phillips, 2002). The calculation of e-learning ROI is applicable using the following formula:

$$ROI(\%) = \frac{Benefits - Costs}{Costs} \times 100$$

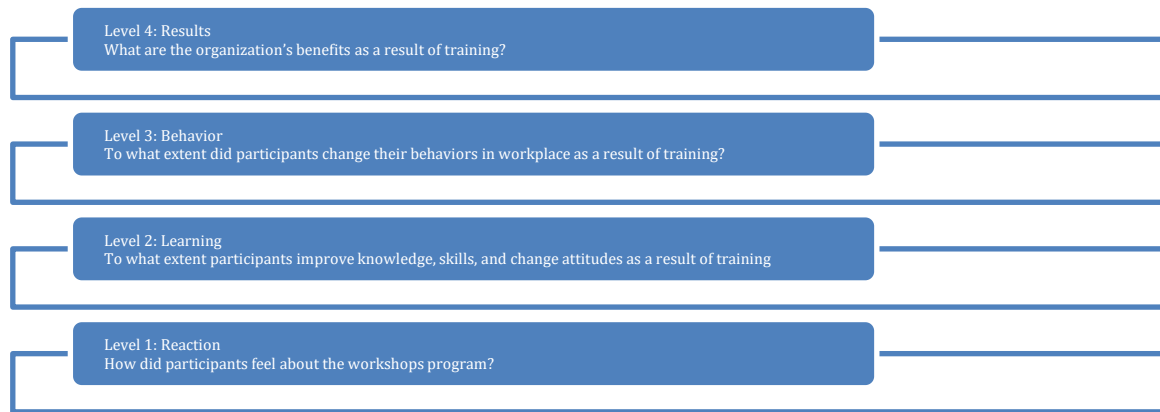
“Benefits” stands for the monetary value generated by a program, while “Costs” encompasses all expenses incurred in its preparation. The investment is deemed successful when its benefits significantly outweigh the incurred costs, for example, in calculating ROI for e-learning.

The Beta company invested \$65,000 in employee training and achieved a sales increase, resulting in earnings of \$175,000. Therefore, the ROI is 169.23%. Bartolic-Zlomislic and Bates (1999), as well as Sjogren and Fay (2002), noted that costs include both fixed costs (those that remain constant regardless of output, such as salaries of e-learning staff) and variable costs (those that increase or decrease in direct relation to output, such as instrument maintenance).

The costs of an e-learning project involve the following: Internal salaries of the e-learning production team, extra costs for staff development, expenses linked to releasing subject experts for the project, and external costs for designers or programmers. Costs of collecting and producing project materials/content, administrative costs, institutional services (including premises, security, labs, etc.), hardware and software procurement, maintenance, and upgrades, as well as administrative costs like telephone and stationery.

Rosenberg (2001) categorized financial benefits into three main groups: Direct (the "cost" category of direct financial benefits), indirect (the estimated financial benefits from "quality," "service," and "speed" categories), and on-selling. Additionally, he noted that indirect benefits, which are challenging to empirically estimate, should be used cautiously. Furthermore, not all institutions may be comfortable with the idea of on-selling their e-learning materials. Several models have been developed with the aim of measuring ROI for e-learning programs.

A. The Kirkpatrick's model: The Kirkpatrick's model, widely employed in evaluating academic programs, encompasses four levels: Reaction, learning, behavior, and result (Abdulghani et al., 2014), as illustrated in Fig. 1.



**Fig. 1:** Kirkpatrick model for program evaluation (Abdulghani et al., 2014)

1. **Reaction:** This level focuses on assessing the satisfaction of the participants in the e-learning program, which may include students, faculty members, technicians, and administrators. The success of the university's academic e-learning program is determined by the high level of satisfaction among participating students, which in turn motivates them to learn.
2. **Learning:** This level involves measuring various variables, such as changes in attitudes, acquired knowledge, and enhanced or improved skills.
3. **Behavior:** This level focuses on evaluating the extent to which participants in the e-learning program apply the skills they have acquired.
4. **Result:** This level focuses on evaluating the institutional-level benefits that arise from training and education.

The Kirkpatrick model has garnered praise from many scholars for its overall strengths in appraisal theory and application. It is commended for offering a simplified language to assess various outcomes and for providing guidance on extracting valuable information from these outcomes.

It provides a practical approach for evaluating existing e-learning programs and using the findings to guide future development—a practical approach to complex evaluation processes.

B. The Kirkpatrick–Phillips training evaluation model: Kirkpatrick's original four-level model was later enhanced by Jack Phillips, who introduced a fifth level. Table 1 presents an overview of the levels and their respective descriptions within the Kirkpatrick–Phillips training evaluation model.

**Table 1:** Kirkpatrick–Phillips training evaluation model

Level	Description
Reaction, satisfaction, and planned action	The individual participant's level of satisfaction with the training program is measured. His or her personal plan of action is also determined
learning	Measure the skills and knowledge gained
Application and implementation	Changes in behavior, application on the job, and extent of implementation are measured
Business impact	The impact on the business is measured
ROI	Monetary value is compared with the cost of the training

This model introduces a fifth level to Kirkpatrick's model, which is ROI. This level involves comparing the monetary value with the training costs.

C. Training ROI and risk measurement model: Jasson and Govender (2017) introduced an evaluation model, which is detailed in Table 2.

**Table 2:** Training ROI and risk measurement model

Step	Measure	Evaluation criteria	Factors
1	PDP and motivation	Is trainee motivated for training as per the personal development plan or PDP?	Trainee performance gaps+ intrinsic motivation+ extrinsic forces
2	Learned behavior	What knowledge, skills, values, and attitudes are gained from training?	Compare competencies behavior and engagement prior to+ after training
3	Applied behavior	Was the learned behavior applied, and did performance improve?	Performance improvement after training+ responsibilities+ accountability
4	Business impact	Did the performance improvement achieve the business's strategic goals?	Organizational capabilities prior to+ after training
5	ROI calculation	Do the benefits exceed the costs of training?	Soft and hard costs+ benefits+ business results
6	Risk management	What risks prevent trainees from improving performance	Barriers to training transfer before, during, and after training+ quantity and quality of performance improvement

This model consists of six steps for assessing evaluation criteria through questions posed at each stage. The model evaluates the following factors:

- Step 1. Identify gaps in trainee performance and self-motivation.
- Step 2. Assess the trainee's knowledge before and after the training.
- Step 3. Evaluate the trainee's performance both before and after training.
- Step 4. Assess the organization's growth capabilities before and after training.

- Step 5. Calculate the costs and benefits associated with training.
- Step 6. Identify the risk factors that may hinder the transfer of effective training into improved performance and organizational improvement.

D. Yamani's model: Yamani (2023) proposed a conceptual framework for evaluating the ROI of e-learning programs at Saudi Universities (Fig. 2). This framework integrates the ADDIE model for designing e-learning programs, providing detailed procedures for program execution, with various evaluation models for e-learning, including the Kirkpatrick's model for evaluating ROI. This model

contains seven stages: Analysis, cost calculation, design, development, implementation, benefit calculation, and final ROI Calculation.

The researchers benefited from the previous evaluation models to guide the calculation procedures for the ROI for the selected electronic course development projects at Umm Al-Qura University. The researchers benefited from the previous evaluation models in determining the procedures for calculating the ROI for the selected project of electronic course development at Umm Al-Qura University.

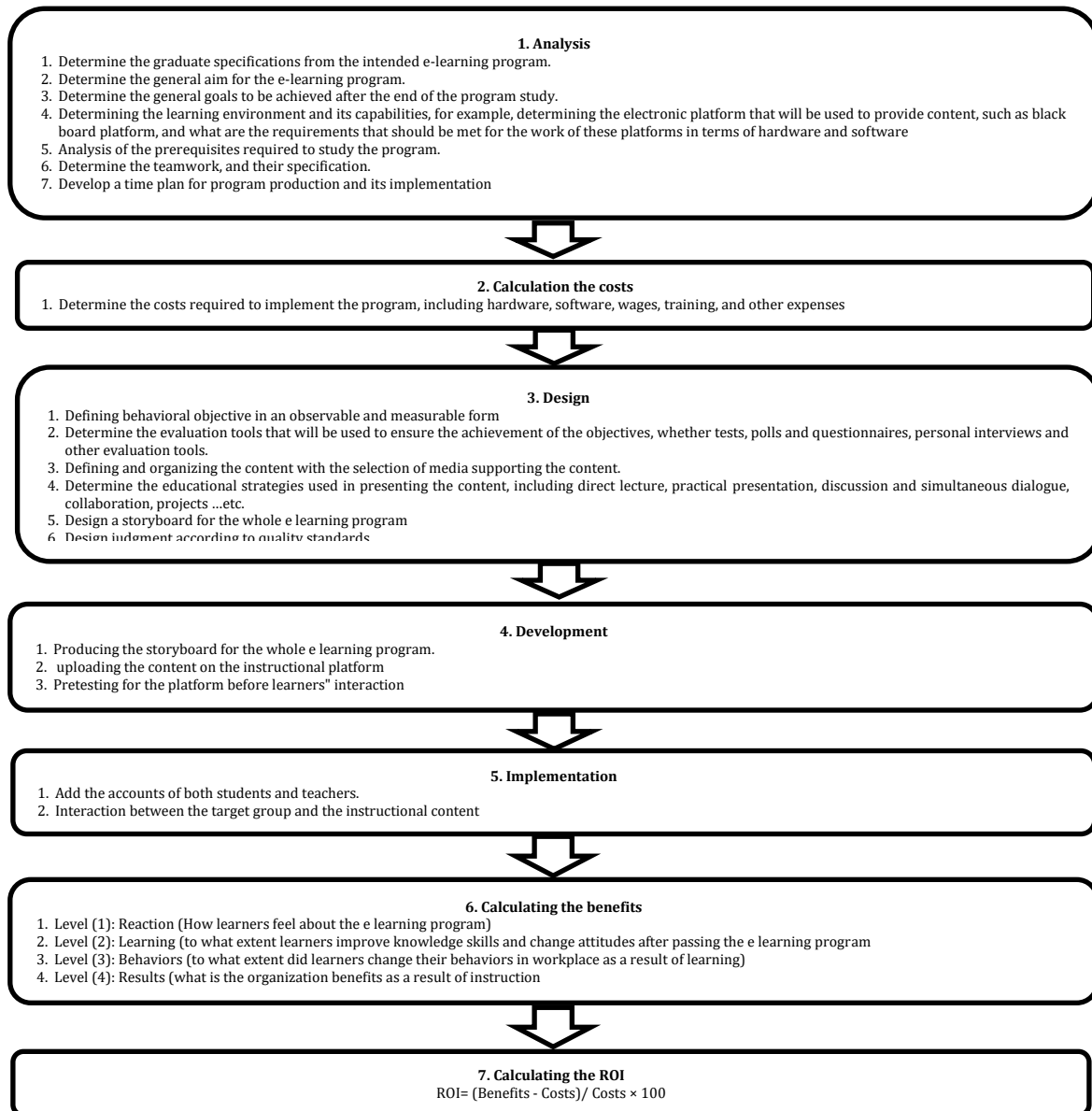


Fig. 2: Yamani's model for evaluating the ROI of an e-learning program (Yamani, 2023)

### 3. Methodology

This research employs a descriptive and analytical approach to determine the ROI of the electronic course development project at Umm Al-Qura University. It involves describing and analyzing relevant literature related to the research problem, describing and building research tools, and

statistically manipulating and analyzing the collected data. Table 3 shows the list of courses (60 courses).

### 4. Results and discussion

To address the research question, "What is the ROI for the electronic course development project

conducted at Umm Al-Qura University from 2019 to 2022?" The researchers follow the following steps:

1. Defining the courses that will be developed electronically in coordination between the Deanship of E-Learning and Distance Education

and the colleges and institutes at Umm Al-Qura University.

2. Defining the road map and the time plan for the development process: The road map consists of several procedures:

**Table 3:** The list of courses that will be developed electronically

No.	Course name	College	No.	Course name	College
1	General chemistry1 parasitology	Applies sciences	31	Islamic culture 3	Daawa and Osool Eldeen
2	Analytical chemistry	Applies sciences	32	Islamic culture 4	Daawa and Osool Eldeen
3	Parasitology and medical	Applies sciences	33	Introduction to the study of premises	Sharia and Islamic studies
4	Spectroscopic and electrochemical analysis methods	Applies sciences	34	Jurisprudence fundamental	Sharia and Islamic studies
5	Introduction to medical physics	Applies sciences	35	Semantics 1	Sharia and Islamic studies
6	The foundations of design	Art and design	36	History of the modern and contemporary Arab world	Sharia and Islamic studies
7	Computer design principles 1	Art and design	37	The history of the Rashidun era	Sharia and Islamic studies
8	Professional ethics	Art and design	38	History of the Kingdom of Saudi Arabia	Sharia and Islamic studies
9	Drawing skills	Art and design	39	Biography of the Prophet	Sharia and Islamic studies
10	Computer design principles 2	Art and design	40	Contemporary financial transactions - the foundations of Islamic economics	Sharia and Islamic studies
11	Creative thinking for graphic design	Art and design	41	Medical microbiology	Public health and medical informatics
12	Photography and digital	Art and design	42	Total quality management in healthcare	Public health and medical informatics
13	Marketing principles	Business administration	43	Research methodology	Public health and medical informatics
14	Principles of business administration	Business administration	44	introduction to public health	Public health and medical informatics
15	Contemporary financial transactions - the foundations of Islamic economics	Islamic economics and finance	45	Occupational health and safety	Public health and medical informatics
16	Volleyball skills	Physical education	46	Biostatistics	Public health and medical informatics
17	Health assessment course	nursing	47	Introduction to environmental health	Public health and medical informatics
18	History of the modern and contemporary Arab world	History department	48	Pharmaceutics III	Pharmacy
19	The history of the Rashidun era	History department	49	Pharmaceutical analytical chemistry II	Pharmacy
20	History of the Kingdom of Saudi Arabia	History department	50	Complementary and alternative medicine (CAM)	Pharmacy
21	Biography of the Prophet	History department	51	Approach to pharmacy profession	Pharmacy
22	Inheritance 2	Judicial studies and regulations	52	Therapeutics 1	Pharmacy
23	The Holy Quran	Daawa and Osool Eldeen	53	Diagnostic immunology	Medical sciences
24	Islamic culture 1	Daawa and Osool Eldeen	54	Medical genetics	Medical sciences
25	Introduction to the sciences of the Qur'an	Daawa and Osool Eldeen	55	General neighborhoods	University College in Gamoum
26	Introduction to the study of faith	Daawa and Osool Eldeen	56	Arabic	Arabic language and its literature
27	Islamic culture 2	Daawa and Osool Eldeen	57	Prosody in the Arabic language	Arabic language and its literature
28	Dental anatomy	Dentistry	58	Introduction to medical physics	Deanship of the common first-year
29	Learning skills	Deanship of the common first-year	59	Computer programming skills	Deanship of the common first-year
30	computer skills	Deanship of the common first-year	60	English 101	Social science

A. Establishing the overarching goal for the project, which includes electronically developing 60 courses.

B. Analyzing the working environment and its capabilities, including hardware and software, the electronic platform that will be used to provide courses (blackboard platform) to deliver courses, and the necessary team members along with their specifications.

C. Creating a project implementation timeline, starting from 2019 and ending in 2022.

D. Determining the project's execution procedures, which encompass the course design process, course production, implementation of courses in the teaching and learning process, and the evaluation process to ensure course quality.

3. Calculate the costs of the project: The deanship collaborated with the university administration and worked with the Ministry of Finance to determine the project's costs, totaling 4,500,000 Saudi riyals, equivalent to \$1,100,000. These expenses covered employee salaries, equipment,

and the necessary programs for course development.

Additionally, it provides financial incentives for faculty members who teach courses and ensures course readiness for both faculty and students transitioning to electronic learning.

4. Defining the benefits of the project: The benefits of the project are categorized into two branches: direct benefits and indirect benefits.

A. The "cost" component of direct financial benefits: To calculate the direct financial benefits, the researchers attempted to assess the cost-saving contributions of the developed e-courses, in line with what Rosenberg (2001) mentioned:

A.1. Operational cost of university buildings and halls: Through interviews with individuals responsible for operating the university's buildings and lecture halls, the researchers inquired about the average operational cost associated with each lecture. This encompassed maintenance, electricity, internet, and cleaning services. It was determined that the hourly cost of operating a lecture hall amounts to approximately 20 Saudi riyals, equivalent to 5.3 US dollars.

With an average course duration of approximately 46 hours, a single course leads to savings of  $(5.3 \times 46) = 243.8$  dollars from the annual budget allocated to operating university halls. The total reduction in operational costs for university halls over the course of three years is calculated as follows:  $(60 \text{ hours} \times \$5.3 \times 3 \text{ years}) = \$9,540$ .

A.2. Travel costs: Through several interviews with faculty members and students, it was determined the average monthly transportation expense for studying at the university campus falls within the range of 200 Saudi riyals, equivalent to 53.3 dollars per month, or approximately 1.7 dollars per week. Therefore, one course leads to a weekly saving of 1.7 dollars in transportation expenses, given that the study is conducted remotely. Each course results in savings of approximately \$40.8 per year over 24 study weeks (calculated as  $\$1.7 \times 24$ ). Furthermore, the average number of students in each course is 130 per year. Therefore, one course contributes to an annual reduction in transportation expenses for students by  $(130 \times 40.8) = 5,304$  dollars.

The 60 courses resulted in a reduction of transportation costs over the course of three years, amounting to \$954,720. Additionally, for the faculty members, with 60 members each saving \$40.8 per year, the total savings in travel costs over three years equal \$7,344. Hence, the overall savings in travel

expenses attributable to electronic courses amount to 962,064 dollars.

A.3. Consumption of raw materials and equipment in laboratories: After conducting several interviews with those responsible for operating the university laboratories, it was determined that the average cost of a student in the laboratory for practical courses is approximately 25 Saudi riyals per week.

Consequently, the cost of a student in one laboratory for the entire year (comprising 40 practical sessions) amounts to approximately  $(25 \times 40) = 1,000$  Saudi riyals. Therefore, electronic courses contribute to saving  $(1,000 \times 130) = 130,000$  Saudi riyals from the operating expenses of the laboratories in the case of practical courses in one year.

Out of the 60 developed courses, 21 are practical courses. These electronic courses have resulted in savings of 8,190,000 Saudi riyals over the course of three years, equivalent to 2,184,000 US dollars. From the above calculations, the total financial benefits amount to  $(43,884 + 962,064 + 2,184,000) = 3,189,948$  US dollars.

B. Indirect benefits: Based on Kirkpatrick's model, the indirect benefits include:

B.1. Reaction: How do participants feel about the e-courses? Through a comprehensive review of numerous studies and literature reviews related to satisfaction measurement in e-learning and e-courses, including works like Van Dam (2004), Voigt and Swatman (2004), Lanzilotti et al. (2006), Palloff and Pratt (2007), Mallinson and Nyawo (2008), and Hadullo et al. (2017).

The authors prepared a satisfaction questionnaire to identify the satisfaction level of both students and faculty members regarding the developed e-course. The questionnaire for measuring beneficiary satisfaction contains three axes: Beneficiary satisfaction regarding themselves (benefits and personal growth as a learner/teacher), beneficiary satisfaction regarding the course (content, activities, design, etc.), and beneficiary satisfaction with the overall system (accessibility, technical support, etc.). The authors administered the questionnaires after calculating their validity and reliability.

The results showed that the students expressed a high level of satisfaction with the electronic courses that were developed and published through the Blackboard learning management system. Table 4 shows the result for student satisfaction in the e-learning system.

**Table 4:** The result for student satisfaction with e-courses

Student's satisfaction	Scale	Strongly satisfied	Satisfied	Neutral	Not satisfied	Strongly dissatisfied.	Mean	Standard deviation	$\chi^2$	df	The result
Result	F	890	540	182	61	9	4.33	0.75	264.53	4	Strongly satisfied
	%	52.91	32.10	10.82	3.63	0.54					

As shown in Table 4, students affirmed their satisfaction with the electronic courses, which

contributed to acquiring new knowledge and skills. Simplifying the study information, enhancing clarity,

and facilitating both individual and collaborative learning with peers.

Learn from anywhere, at any time, with both synchronous and asynchronous communication available within the learning community and members 24 hours a day, promoting independence in learning and self-confidence. Increasing motivation for learning and making it more exciting, ensuring the principle of neutrality and equality among students, and ensuring easy access to

resources, information, and technical support services.

The faculty members also showed a high level of satisfaction with the developed electronic courses due to the ease of learning material modification, teaching from any place, communication with learners at any time, and extracting students' evaluation sheets. Table 5 shows the results for faculty members' satisfaction with e-courses.

**Table 5:** The result for faculty member's satisfaction with e-courses

Faculty member's satisfaction	Scale	Strongly satisfied	Satisfied	Neutral	Not satisfied	Strongly dissatisfied.	Mean	Standard deviation	$\chi^2$	df	The result
Result	F	50	5	2	2	1	4.55	1.35	11.34	4	Strongly satisfied
	%	83.3	8.3	3.3	3.3	1.6					

This result aligns with several studies that have underscored the effectiveness of electronic courses in enhancing beneficiary satisfaction, such as studies by Rhema and Miliszewska (2014), Al-Dalae (2017), Yamani et al. (2020), and Alharthi et al. (2021).

B.2. Learning: To what extent do learners improve their knowledge, skills, and change attitudes after

completing the e-courses? The test results of students in these courses showed a high percentage of the knowledge and skills included in the courses.

This is shown by the statistics of students' results. Table 6 shows the grade levels of students who successfully completed these courses during the academic year 2021/2022.

**Table 6:** The grade levels of students who passed these courses in the academic year 2021/2022

The grade level	A(90-100)	B( 80-89)	C(70-79)	D( 60-69)	F(<60)
Students number	1932	2268	2604	840	756
%	23	27	31	10	9

As Shown in Table 6, the percentage of successful students is 91%, which is notably high. Additionally, 23% of students achieved a score of  $\geq 90\%$  on the learning objectives, 50% achieved a score of  $\geq 80\%$ , and 81% reached a score of  $\geq 70\%$ . 91% achieved a score of  $\geq 60\%$  on learning objectives.

The contribution of e-courses in enhancing the level of learning outcomes acquired may be due to the attractive presentation of instructional content through text, graphics, photos, and video. As well as interactivity and learner's control in reviewing the course content. Providing students with the opportunity to learn according to their abilities and capabilities. This result is consistent with several studies that have emphasized the effectiveness of electronic courses in accomplishing learning objectives, such as studies by Zare et al. (2016), Aljaser (2019), Stephan et al. (2019), and Omeish (2021).

B.3. Behaviors: To what extent did learners change their workplace behaviors as a result of their learning experience?

After the conclusion of the project, several questionnaires were distributed to assess the extent to which both students and faculty members applied the technical skills they gained while interacting with these courses. Additionally, the questionnaires measured the level of engagement of faculty members and students with e-learning environments.

The results have shown that 90% of students who took electronic courses now use both synchronous

and asynchronous communication tools to collaborate and share with their peers when performing tasks. Furthermore, 98% of the faculty members confirmed their ongoing use of e-learning strategies to deliver concepts, knowledge, and skills to their students in their respective courses.

This result may be due to the multiplicity of media used to display instructional content across electronic course pages. This principle leads to an increase in the permanence of learning. This result aligns with several studies that have emphasized the important role of e-learning in training and its effectiveness in facilitating the transmission of training outcomes, such as studies by Kamal et al. (2016), Belaya (2018), Martins et al. (2019), and Akpoviro and Adeleke (2022).

B.4. Results: What are the organization's benefits as a result of instruction?

The authors administered an open questionnaire to individuals interested in and specialists in e-learning, as well as employees within the investment unit at Umm Al-Qura University, seeking their opinion on the benefits that Umm Al-Qura University has gained from the implementation of this project. The results are outlined as follows:

1. Sixty electronic courses were produced and developed. These courses can be presented in the following years with the convenience of modification and revision, resulting in cost savings for content development compared to traditional courses.



2. Contribute to reducing the operational costs of university buildings and laboratories, as teaching and learning can occur remotely.
3. Four hundred learning objects have been created, which can be reused in several other courses.
4. Developing the competencies and skills of faculty members and students in using e-learning management systems, with some faculty members even acquiring the ability to develop electronic courses.
5. The university now boasts a specialized staff dedicated to designing and developing electronic courses capable of executing e-learning program projects proposed by various university institutions. This internal expertise results in substantial cost savings for the university compared to outsourcing such projects.

These results align with a study by [Curran \(2004\)](#) that analyzed the experiments of universities in Europe and the United States as case studies. The study revealed that e-learning strategies adopted by universities contributed to enhancing investment in higher education through widening access to educational opportunities, enhancing the quality of learning, and reducing the cost of higher education. [Mending et al. \(2005\)](#) conducted a study to examine the investment in e-learning projects (Learn@WU, EducaNext, and HCD-Online) in Economics and Business Administration at Vienna University. The study aimed to present empirical cost structures and potential investment models and found significant potential for revenue. E-learning enables academic institutions to save a great deal of money and time. Saved electronic courses and digital learning elements can be subsequently used to improve the overall quality of the learning process. For large organizations, e-learning serves as an ideal solution for employee training and workforce skill development, irrespective of the prevailing economic climate.

5. Calculating the ROI as follows: As previously mentioned, the project's cost is \$1,100,000.

The financial benefits are:

- The savings in operational costs for university buildings and halls amount to approximately \$43,884.
- Approximately \$962,064 in travel costs have been saved.
- The savings in the consumption of raw materials and equipment in laboratories is approximately \$2,184,000.

The total financial benefits for the project amount to \$3,189,948.

The ROI (%) can be calculated as follows:

$$ROI (\%) = [(Total\ Benefits - Total\ Costs) / Total\ Costs] \times 100$$

$$ROI (\%) = [(\$3,189,948 - \$1,100,000) / \$1,100,000] \times 100$$

$$ROI (\%) = (\$2,089,948 / \$1,100,000) \times 100$$

$$ROI (\%) \approx 190\%$$

A ROI of 190% is excellent, indicating that the benefits significantly exceeded the costs. The researchers concluded that this project was highly successful from the perspective of ROI. This means it will bring over twice the value compared to the investment made in it.

This result aligns with several findings from previous research and studies on evaluating the ROI in e-learning programs. [Phillips et al. \(2001\)](#) mentioned that the ROI% due to e-learning usage in employee training in the United Petroleum Institute was 206%. Every dollar spent on training yielded a \$4.53 return, which is consistent with our findings.

The Beta Company invested \$65,000 in employee training and managed to increase sales, earning \$175,000, resulting in an ROI of 169.23%. Additionally, as mentioned and discussed previously, there are several indirect benefits related to raising the satisfaction levels of both students and faculty members at Umm Al-Qura University, as well as elevating the achievement levels of the learners. Developing the skills of students and faculty members in using computer, internet, and distance communication tools and improving the institutional work system within Umm Al-Qura University.

## 5. Conclusion

Calculating the ROI is a critical method used to assess the effectiveness of e-learning programs and projects in universities. This approach enhances the efficiency of these initiatives and aids decision-makers in planning future e-learning strategies. An analysis of the ROI from the electronic courses development project at Umm Al-Qura University from 2019 to 2021 suggests several recommendations:

1. Support for decision-making: The findings encourage the use of ROI in evaluating e-learning programs across higher education.
2. Specialized units: There is a proposal to establish units within universities dedicated to studying and analyzing ROI for e-learning initiatives.
3. Funding: The recommendations include securing necessary funding for e-learning programs in higher education.
4. Periodic evaluation: It is suggested that e-learning projects at Saudi educational institutions be assessed periodically.
5. Further research: More studies should be conducted on the best practices and models for calculating ROI in e-learning.
6. Stakeholder collaboration: Cooperation among stakeholders is recommended to develop an ROI model that considers both financial and non-financial benefits.

## 7. Strategy evaluation using ROI: Employing the ROI approach to evaluate and refine the e-learning strategies of higher education institutions.

These recommendations aim to optimize the management and expansion of e-learning programs, ensuring they meet educational and financial goals efficiently.

### Compliance with ethical standards

### Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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