

A Proposed Framework for Evaluating the Return on Investment of E-Learning Programs at Saudi Universities

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Summary

The purpose of this study is to introduce a proposed Framework for Evaluating the Return on Investment (ROI) of E-Learning Programs at Saudi Universities. To achieve this goal, the descriptive analysis methodology is used to analyze the literature review about e-learning and its evaluation from different viewpoints, especially from the ROI-related perspective. As well as the literature reviews related to ROI and the methods of calculating it inside society institutes. This study suggests a conceptual framework for evaluating the ROI of E-Learning Programs at Saudi Universities. This framework is based on the merging process among the analyze, design, develop, implement, and evaluate (ADDIE) model for designing e-learning programs, which gives detailed procedures for executing the program, several evaluating models for e-learning, and the Kirkpatrick model for evaluating the ROI of e-learning. It consists of seven stages (analysis, calculating the costs, design, development, implementation, calculation of the benefits, and calculation of the final ROI).

Keywords:

E-Learning, Return on investment, Evaluation, Saudi Universities

1. Introduction

Technology is one of the most important factors helping different sectors increase productivity thanks to its ability to reduce costs and rapid data processing, making it an important competitive tool. It can be employed in the education sector to promote e-learning to ensure digital efficiency and increase the quality of educational outputs [1]. E-learning is one of the educational strategies that make the education-training process of students in higher education institutions more interactive to ensure efficient operation and efficient spending, as high-cost issues are forefront of the most important issues that higher education institutions focus on, paying attention to the quality of digital content [1]. The benefits and advantages of e-learning are widely recognized, especially after the COVID-19 pandemic. The process of quality control, cost reduction, and return-on-investment calculation is one of the important issues that higher education institutions should invest in to successfully develop their educational programs and update them according to what is calculated from the return. Investing in these digital materials and

electronic courses is considered a strategic direction for calculating the cost of e-learning and distance education compared to traditional face-to-face education [1].

The evaluation process is an essential stage in the development of curricula and programs in education, including e-learning and distance education programs. Authors in [2, 3] mentioned that there is a need to implement an evaluation process for e-learning programs and systems and analyze their effectiveness, where evaluation is considered a vital necessity to ensure successful delivery, effective use, and positive effect on learners.

Various frameworks and models aim to evaluate e-learning from many perspectives. Authors in [4] proposed a conceptual e-learning assessment model, hexagonal e-learning assessment model (HELAM), suggesting a multi-dimensional approach for e-learning evaluation: (1) system quality, (2) service quality, (3) content quality, (4) learner perspective, (5) instructor attitudes, and (6) supportive issues. Authors in [5] mentioned that research on e-learning evaluation, using pedagogical principles and organizational issues, is limited. The evaluation framework contains the following four dimensions: Financial perspective, e-learner perspective, internal process perspective, and learning and growth perspective.

Authors in [3] proposed a framework based on the structures and indicators from previous models and theories to suit the natural of e-learning. The framework model includes seven independent dimensions: technical system quality, information quality, service quality, education system quality, support system quality, learner quality, and instructor quality. There are also four dependent dimensions: perceived satisfaction, perceived usefulness, system use, and benefits. Each dimension contains several items that indicate the quality level. Also, there are many attempts to adapt evaluating models from different fields, such as business, to the academic context for which they are used [6, 7].

One of the most famous models adopted in higher education is the model of Cahapay in 1959, whose purpose was to help find a methodology for calculating what results employees achieve after receiving training [8]. Kirkpatrick model in 1976 is considered one of the most powerful models used in the evaluation of e-learning,

especially in higher education, mainly from is ROI in e-learning perspective. It has four dimensions: Reaction, learning, behavior, and result [1, 6, 7, 8, 9, 10, 11].

Measuring the evaluation of e-learning programs, or what we call (ROI in e-learning) in universities, will considerably improve the budgets allocated to education-related issues to ensure the efficiency of optimal operation of academic programs remotely and the proposed future initiatives for e-learning in universities.

The problem is that the fixed costs associated with e-learning initiatives are usually very high, and the variable costs are very low [1]. This means that in addition to the difficulty of tracking the cost for various e-learning projects, whether in open educational resources, digital resources, e-courses, or other digital educational projects, the financial benefits of e-learning programs take a long time to accrue [1].

According to the Emerald Works report, only 8% of education and training officials calculate the ROI for their educational programs. This is less than 1 in 10 educational institutions that measure the return on their education and training investment [11]. It is considered a risk not measuring this, as reports show that universities spend on their academic programs and development, including electronic ones. Therefore, these expenditures should be used and invested in supporting universities.

This study aims to introduce a proposed framework for evaluating the ROI from e-learning programs at Saudi Universities. It is based on taking advantage of the e-learning evaluation models mentioned above and considering the preparation process for e-learning programs at Saudi Universities.

2. Theoretical Consideration

2.1. Investment in E-learning:

As for the budgets allocated for e-learning, they are usually considered part of the basic budgets provided in the educational institution, resulting in substantial savings at the long-term level in terms of saving travel costs and flexible scalability, as well as in training human cadres and qualifying them with the new skills required by the updated academic programs and available in training budget for them rather than face-to-face training in traditional workshops [1].

Learning is a means to achieve a goal that should increase students' academic performance at the university, and it should be positively reflected in providing better products and services to beneficiaries of high quality at lower costs [12]. According to Rosenberg, e-learning programs use modern technologies to provide academic and training programs. whether for students or teachers in universities. They are designed to teach various skills focusing on the strategic plans of the university, aiming to improve performance and competitive advantage, reduce

costs, enhance the values of innovation and quality, and increase the market share to provide quality academic programs and digital products. E-learning consists of the following four main elements to achieve quality in these programs [12, 13]:

1. The intention is to improve performance to support operational efficiency and effective spending to improve learning outcomes.
2. Designing e-learning programs to reflect the educational strategy most appropriate to the learning requirements and characteristics of the learner. This also includes postgraduate assessment programs.
3. The method and means by which the institution is formed may include the classroom, various techniques, independent study, or a combination of methods.
4. Accountability that ensures the organization's implementation of quality standards in its academic programs.

Students' needs in e-learning programs can be described in the following ways [12]:

1. Access is the key: Access has four dimensions: technical, as in having the infrastructure to connect to information, network enablement, as in having (or taking) the power or permission to retrieve and use information, as in accommodating parts of the learners and not the trainers' schedule, and time, such as providing the time needed to obtain, review, follow-up and learn information.
2. Comprehensive approach: Created for individual access, employees expect a holistic approach to information that is achievable, accurate, complete, structured, and enabled for ease of retrieval and use.
3. Balance: The balance between training and information structure is very important. The information to be included in the distance programs of the academy must be carefully selected based on specific criteria, as the information and the way it is presented in the exclusive academic programs differs radically from what is provided digitally.

Despite all of the factors mentioned above, determining the ROI in e-learning programs by identifying the direct and indirect benefits in exchange for material and human costs and spent is still challenging to determine due to the overlap of many reasons for delay in obtaining the benefit in the long run [12]. Calculation of the ROI determined by the university for its programs is very important to run the programs for the university in line with its plans and strategic goals and return them with an ROI. It also allows them to evaluate the existing programs and determine the extent of the profit obtained from them. In the context of e-learning and distance

education, it is very important to determine the ROI in it to determine the income value and the feasibility of the existing e-learning academic program and thus work to improve or develop it.

2.2. Measuring the return on investment to E-learning:

E-learning has several benefits that are important inputs when measuring the ROI in e-learning. To determine the importance of continuing or discontinuing e-learning programs or even developing and improving them, this matter is necessary to prove that the return of such programs adds value to the university, leads to investment returns for the university, and improves the organizational results of the educational institution (...). ROI is defined as the ultimate measure of the success of an investment in a particular sector. Its importance lies in showing the percentage of what is put into the programs in exchange for what will be returned to the educational institution from this allocation [11]. There are various options for choosing e-learning programs for universities depending on a number of variables according to the strategic goals of the university to be achieved, the skills required in the labor market, and human digital capabilities availability. Measuring the costs and benefits of e-learning programs provides the financial basis that helps make previous decisions [14]. E-learning usually involves many large priority expenditures, followed by several marginal costs of approximately low proportion. Therefore, adopting e-learning programs is an investment decision for educational institutions. The university has the right to calculate the average ROI in e-learning programs using the following equation [14]:

$$ROI = \frac{(net\ benefits\ y1 + net\ benefits\ y2 + net\ benefits\ yn)/n}{Initial\ investment} \times 100$$

Thus, the average net benefit is calculated by adding the net benefit for each year and dividing it by the number of years (n), which is the expected life of the investment. It is then divided by the total priority cost allocated for investment in e-learning programs, then multiplied by 100 to obtain the average ROI as a percentage. Thus, the ROI is the positive financial result of the academic e-learning program divided by the amount spent on investment in these programs. An important point to add to the aforementioned factors regarding the returns on investment in e-learning is that it can be logically explained when it is compared to another variable, for example, a comparison of the ROI in e-learning academic programs and traditional education programs that take place simultaneously and under the same conditions. A positive ROI in e-learning programs means that the investment has paid off, while a negative ROI indicates losses and that the online program needs to be changed.

ROI calculations in e-learning programs allow both the benefits and costs of the investment to be converted into a single monetary value to compare the effectiveness of investment in these e-learning programs. If the university can generate a positive ROI in e-learning programs, the university is then considered a good position in terms of the planning that took place in these programs and that it is proceeding in accordance with the strategic plan of the university and is in line with what is required in the labor market.

2.3. How to Measure E-learning ROI:

Successful e-learning programs require the university to demonstrate value for the investment made. Therefore, the ROI in e-learning is very similar to the ROI in traditional [11]. Thus, the academic e-learning program is considered successful if the value and benefits are proven to exceed the incurred costs. Therefore, universities should measure the ROI in e-learning programs through, for example, the following: [11]. Increase customer satisfaction.

Increased productivity.

1. Revenue improvement.
2. Lower costs.

While the costs usually include the required development in these programs and the human resources to be employed for these academic e-learning programs, in addition to the digital technologies and tools required to implement these programs, such as educational platforms, technical infrastructure, and the development of electronic courses. There is no official or standard model to measure e-learning ROI. However, some models such as Kirkpatrick and Phillips are used to measuring the e-learning ROI [11].

Author in [15] described how to calculate the ROI of e-learning using the following formula:

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

“Benefits” are the monetary value generated by a program, while “costs” are all the expenses incurred in developing and implementing this e-learning program. An investment is considered successful when its benefits are considerably higher than the incurred costs.

The costs include content creation/purchase, software purchase/development, and project management. Defining the benefits include the following three steps:

- Identify the key performance indicators (KPIs)
- Agree on how much you want them to change (%)
- Calculate how much monetary gain this change will introduce

The KPIs can be defined accurately in the e-learning field

according to Kirkpatrick model of evaluation.

2.4. The Kirkpatrick Model of Evaluation

In education, it is preferable to use an applied approach to collect information that helps to make decisions and identify problems through observation, experiment, analysis, comparison, and inference to reach logical results at a time when pressure is increasing, especially on the education sector, to study the results that have been obtained. They are evaluated to determine the proficiency level for these distance academic programs [16]. While various models are used to evaluate academic programs, Donald Kirkpatrick's model in [17] has been the primary organizational design model for evaluation for thirty years [16].

The Kirkpatrick model was initially used to evaluate training programs and later became widely used in other aspects of evaluation, including academic programs. Kirkpatrick's model consists of four stages, and each level impacts the next level. These levels are reaction, learning, behavior, and result [16]. The model's stages are illustrated in Figure 1 [16].

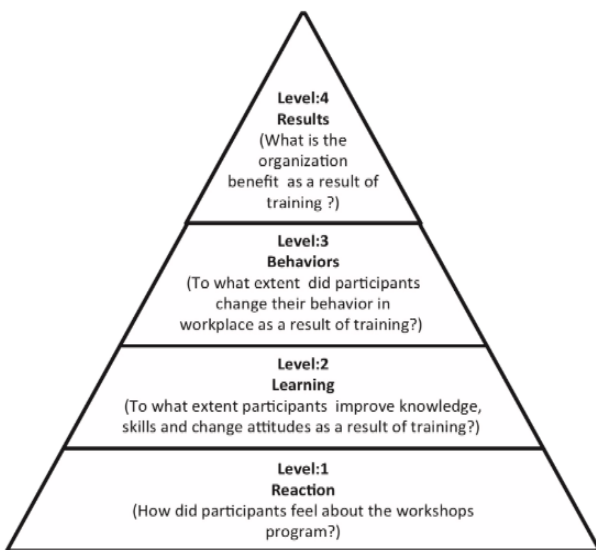


Fig1. Kirkpatrick model for program evaluation [16].

- *Reaction*

At this stage, the participants' satisfaction in the academic e-learning program is measured, whether they are students, faculty members, or even technicians and administrators involved in preparing and supervising it. The academic e-learning program offered by the university is considered successful if the participating students have a high level of satisfaction and therefore are motivated to learn, which makes it important to work on a plan to motivate them to follow the e-learning program to increase their level of satisfaction. After

completing the academic e-learning program, the level of satisfaction was measured through a questionnaire with a number of variables related to the program, such as the level of the faculty member, the technical infrastructure, the e-learning environment, and the technologies used.

- *Learning*

Learning is defined as an improvement in the knowledge, change in attitudes, or enhancement of skills of program participants. Among the components that need to be measured are: What attitudes have changed? What knowledge was learned? What skills have been strengthened or improved? Measuring this welcome requires specific tests to measure each previous question. Measuring this level is an activity that must occur over a long period of time, weeks, or months after the input participants have received from the e-learning program.

- *Behavior*

This stage depends on the participants in the e-learning program applying the learned skills and therefore depends on changing attitudes after the program.

- *Result*

At this stage, the evaluation focuses on the results after completing the e-learning program. This stage is considered an evaluation stage of the results for long term.

- Many scholars have commended the general strengths of the Kirkpatrick model concerning evaluation theory and practice because it provides the following[10, 17]: Simple language for dealing with different results and how to extract information from these results
- Evaluative or descriptive information on the type of e-learning academic programs that provides a practical approach to evaluate existing e-learning programs and develop them in the future based on the results
- A practical approach to complex evaluation processes

Thus, Kirkpatrick's model has considerably contributed to valuation theory and practice.

3. The Proposed Framework

By reviewing the evaluation models for e-learning systems and the references related to Kirkpatrick's model in the evaluation and by reviewing many preparation and design models for e-learning programs, such as ADDIE model, which aims to introduce organized stages for e-learning programs, production is as follows [18].

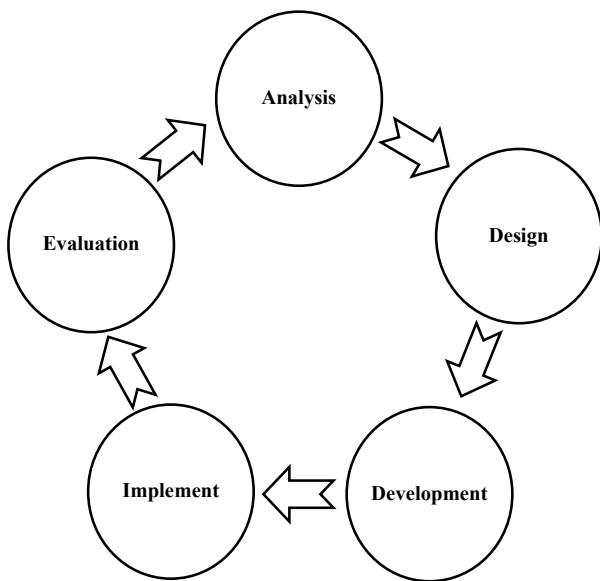


Fig.2. ADDIE Model [18].

1. **Analysis:** Determining the instructional goals to be achieved and defining the learning environment and its capabilities, for example, defining the electronic platform that will be used to provide content and the requirements that should be met for the work of these platforms in terms of hardware and software. As well as identifying the characteristics and skills of the learners.
2. **Design:** Determining the evaluation tools that will be used to ensure the achievement of the objectives, whether tests, polls and questionnaires, personal interviews, and other evaluation tools, and defining and organizing the content with the selection of media that support the content. As well as identifying the educational strategies used in presenting the content that are commensurate with the nature of the content and the characteristics of the target group.
3. **Development:** Producing the content and media designed in the previous step and uploading the content to the instructional platform
4. **Implementation:** Preparing the content delivery platform, adding the accounts of both students and teachers, and then interacting with the target group with the educational content
5. **Evaluation:** The instructional goals achievement is determined by applying the evaluation tools previously prepared in the second stage of the model. Also, a feedback cycle that contributes to the evaluation of each stage of the model.

The author suggests a proposed Framework for Evaluating the Return on Investment from E-Learning

Programs at Saudi Universities as **Fig 3.**

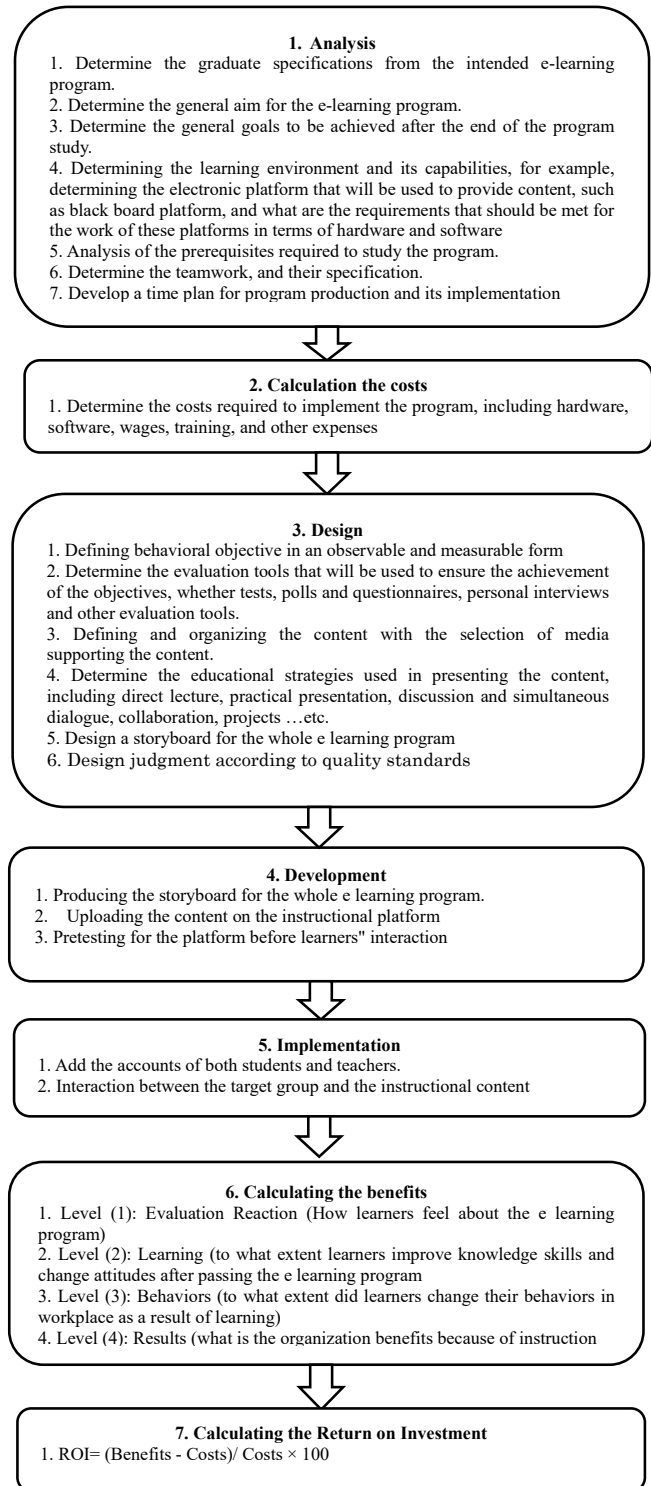


Fig 3. The proposed Framework for Evaluating the Return on Investment from E-Learning Programs at Saudi Universities

1. Analysis

1. Determine the graduate specifications from the intended e-learning program.
2. Determine the general aim for the e-learning program.
3. Determine the general goals to be achieved after the end of the program study.
4. Determining the learning environment and its capabilities, for example, determining the electronic platform that will be used to provide content, such as black board platform, and what are the requirements that should be met for the work of these platforms in terms of hardware and software
5. Analysis of the prerequisites required to study the program.
6. Determine the teamwork, and their specification.
7. Develop a time plan for program production and its implementation

2. Calculation the costs

1. Determine the costs required to implement the program, including hardware, software, wages, training, and other expenses

3. Design

1. Defining behavioral objective in an observable and measurable form
2. Determine the evaluation tools that will be used to ensure the achievement of the objectives, whether tests, polls and questionnaires, personal interviews and other evaluation tools.
3. Defining and organizing the content with the selection of media supporting the content.
4. Determine the educational strategies used in presenting the content, including direct lecture, practical presentation, discussion and simultaneous dialogue, collaboration, projects ...etc.
5. Design a storyboard for the whole e learning program
6. Design judgment according to quality standards

4. Development

1. Producing the storyboard for the whole e learning program.
2. Uploading the content on the instructional platform
3. Pretesting for the platform before learners" interaction

5. Implementation

1. Add the accounts of both students and teachers.
2. Interaction between the target group and the instructional content

6. Calculating the benefits

1. Level (1): Evaluation Reaction (How learners feel about the e learning program)
2. Level (2): Learning (to what extent learners improve knowledge skills and change attitudes after passing the e learning program)
3. Level (3): Behaviors (to what extent did learners change their behaviors in workplace as a result of learning)
4. Level (4): Results (what is the organization benefits because of instruction)

7. Calculating the Return on Investment

1. $ROI = \frac{\text{Benefits} - \text{Costs}}{\text{Costs}} \times 100$

As shown in Fig 3., the proposed model contains the following seven stages:

1. **Analysis:** This stage aims to make a comprehensive vision of the basics for e-learning program initiation and the ability to execute it. This stage contains several steps, including the determination of graduate specifications. Determination of the general aim of the e-learning program. Determination of the general goals to be achieved after the end of the program. Determining the learning environment and its capabilities, for example, determining the electronic platform that will be used to provide content, such as the blackboard platform, and the requirements that should be met for the work of these platforms in terms of hardware and software. Analyzing the prerequisites required to study the program, such as needed skills for learners. Determination of the teamwork, their specification, and their roles in building the program. This stage ended by developing a time plan for program production and its implementation.
2. **Calculation of the costs:** This stage determines the costs required to execute the e-learning program, including hardware, software, wages, training, and other expenses such as transportation, maintenance.
3. **Design:** This stage aims to prepare a comprehensive vision for the e-learning program as the learners will see it. This stage contains several steps, including defining behavioral objectives in an observable and measurable form. Determination of the evaluation tools that will be used to ensure the achievement of the objectives, whether tests, polls and questionnaires, personal interviews, and other evaluation tools. Defining and organizing the content with the selection of media supporting the content. Determination of the instructional strategies used in presenting the content, including direct lecture, practical presentation, discussion, simultaneous dialogue, collaboration, and projects. Designing a storyboard for the e-learning program containing multimedia content distribution and interaction tools.
This stage ended with the judgment of e-learning program design according to quality standards such as Quality Matters Standards (QM)^{*1}, which

evaluate the e-courses according to eight branches (Course overview and its presentation, learning objectives, evaluating and measurement, learning materials, activities and learner interaction, course technology, learner support, usability, and accessibility).

4. **Development:** This stage involves converting the program's design to a produced form where learners can interact with it. This stage contains producing the storyboard for the whole e-learning program. Uploading the content on the instructional platform. At the end of this stage, the pretesting for the platform should occur before the learners' interaction.
5. **Implementation:** This stage concerns the interaction between learners and the program. There are three kinds of integration (learner-content/learner-learner/learner-instructor).
6. **Calculation of the benefits:** This stage aims to define and calculate the benefits of the e-learning program based on the following factors:

The most important factors that should be considered are the reports issued by the system about the progress of the learning process for learners.

- **Reaction:** The satisfaction level of the learners in the e-learning program is measured, whether they are students, faculty members, or even technicians and administrators involved in preparing and supervising it. It is usually measured after completing the e-learning program through a questionnaire to determine the level of satisfaction with several variables such as the level of the faculty member, the technical infrastructure, the learning environment, and the technologies used. **Learning:** Measuring the improvement in the knowledge, change in attitudes, or enhancement of skills for the program participants. Among the components that must be measured are: What attitudes have changed? What knowledge was learned? What skills are strengthened or improved? Measuring this welcome requires specific tests to measure each previous question. Measuring this level should occur over a long time, weeks or months after the e-learning program ends.
- **Behavior:** This stage concerns applying the skills learned and

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<https://www.qualitymatters.org/qa-resources/rubric-standards>

therefore depends on changing attitudes after the program. This option can be done by applying questionnaires or by direct observation.

- *Result:* The evaluation at this stage is a final evaluation that focuses on the results after completing the e-learning program for the organization. This stage is considered a stage for evaluating the results, and it is long-term.

After identifying the previous KPIs, there is a need to define how much you want them to change (%). Then, calculate how much monetary gain this change will bring.

7. Calculating the ROI: this stage uses the following equation to $ROI = \frac{\text{Benefits} - \text{Costs}}{\text{Costs}} \times 100$

3. Conclusion

Measuring the ROI is one of the most important recent trends in evaluating e-learning programs. Despite the importance of this approach in evaluating e-learning programs, studies and literature indicate that many universities neglect this approach in evaluating their programs. From this viewpoint, this paper presented a comprehensive framework for measuring the ROI from e-learning programs at Saudi universities, detailing the steps for calculating this return, from determining the graduate specifications to calculating the final ROI.

This framework consists of seven stages (1) Analysis: This stage aims to make a comprehensive vision of the basics for e-learning program initiation and the ability to execute. (2) Calculation of the costs: This stage determines the costs required to execute the e-learning program, including hardware, software, wages, training, and other expenses, such as transportation, maintenance, and so on. (3) Design: This stage aims to prepare a comprehensive vision for the e-learning program, as the learners will see. (4) Development: This stage means converting the program's design to produced form where learners can interact with it. (5) Implementation: This stage concerns the interaction between learners and the program. (6) Calculation of the benefits: This stage aims to define and calculate the benefits of the e-learning program. (7). Calculating the ROI: this stage uses the following equation to $ROI = \frac{\text{Benefits} - \text{Costs}}{\text{Costs}} \times 100$

This research can provide a framework for decision-makers in higher institutes to be guided in evaluating e-learning programs within Saudi universities.

This research may be a starting point for further evaluation of e-learning and e- training programs in Saudi Arabia

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