

**British Journal of Education, Society &  
Behavioural Science**  
4(8): 1140-1152, 2014

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## **Program Evaluation: Logic Models in the Saudi Public Educational System's E-Learning**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Author AYN designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors MA and ZA managed the analyses of the study and managed the literature searches. All authors read and approved the final manuscript.*

**Original Research Article**

**Received 20<sup>th</sup> September 2013**

**Accepted 26<sup>th</sup> March 2014**

**Published 28<sup>th</sup> April 2014**

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### **ABSTRACT**

E-learning has become popular in all levels of education for a number of reasons. Its increased accessibility provides courses without the requirement of having to visit a physical classroom, and helps establish self-scheduling and self-confidence. Seventy percent of the population of Saudi Arabia is under 30 years of age. Only 25% of classroom teachers are Saudi citizens; all others hail from other countries. Public education in Saudi Arabia must consider long-term plans that use Internet delivery to augment learning in traditional classrooms.

The methods used in this program evaluation to conduct research include a literature review, the introduction of a logic model, cost benefit analysis and research design.

The main focus of this formative program evaluation is to evaluate e-learning and distance learning as an alternative to the public educational system. E-learning and distance education will create a new phenomenon in Saudi society and will allow citizens an opportunity to take advantage of advancing technology. The purpose of this formative program evaluation is to explore two questions: (1) Will the academic performance of students who use e-learning or exceed compared to the academic performance of traditional students; and (2) What does the Cost-Benefit Analysis (CBA) reveal about a

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long-term, alternative high school delivery system for Saudi students? It is anticipated that academic performance of an experimental group of e-learning students will match or exceed the performance of the control group composed of traditional classroom students, and that a cost benefit analysis will determine the feasibility of offering such a program as an alternative method of education.

A CBA would determine that the benefits to society for implementing an alternative e-learning delivery system for high school study would be affordable. Therefore, the conclusion of this program evaluation would be to proceed with the program.

*Keywords: Distance learning education; program evaluation; benefit-cost analysis.*

## **1. INTRODUCTION**

E-learning has become popular in the higher education arena today for a number of reasons. Among them, the reason cited most often in professional literature is its access from any location without time constraints. E-learning allows students to educate themselves beyond traditional brick-and-mortar institutions, and they can learn at their own pace, schedule their own assignments, and ensure self-confidence [1]. According to [2], e-learning is currently one of the most widely employed uses of technology, which helps society improve, advance, and implement new ways of leaning that could help society at large.

Public education in Saudi Arabia has a long-term plan for using the Internet for teaching and learning in conventional classrooms, as well as a delivery system for e-learning programs. Therefore, this study aims to identify those factors of e-learning in the public educational system, especially ones that relate to academic performance, as well as to evaluate the benefits and costs of a long-term e-learning project in Saudi Arabia.

## **2. PROBLEM OVERVIEW AND PROBLEM STATEMENT**

The construction of a comprehensive educational system is one of the clearest concerns of Saudi officials and educators today. Currently, Saudi Arabia enjoys 24,000 educational systems located throughout country, with four million learners registered at various grade levels [3]. There are 12 institutions of higher education, many teacher's universities, technological and vocational universities, girl's colleges, and religious schools that represent numerous fields of education.

The rapid growth of learners registered in universities has put pressure on these universities. Al-Erieni [2] states that in the past, the public school system's response to an increasing number of learners has been to create new campuses and expand the number of existing schools. This concept can no longer apply to Saudi Arabia due to its lack of economic resources as a result of the Gulf War and other Middle Eastern crises. However, Saudi Arabian officials and educators have begun to experiment with distance education programs as one way to cope with increased learner enrollment [4]. Another problem facing the Kingdom of Saudi Arabia is the lack of the current educational system to deliver the curriculum to remote areas that do not have existing school facilities.

Minoli [4] notes that e-learning has solved most of the problems that Saudi schools have experience. For example, through e-learning, a large number of remote-area classes can be established and give numerous learners the advantage of a high school education without

reporting to a classroom. Therefore, e-learning education reduces the difficulty of traveling and pursuing an education at these institutions. Additionally, it allows students living in remote areas to link to different sources of e-learning, such as student registration, libraries, and health centers. Gibson [5] points out that, of 14.3 million students enrolled in 1,200 universities in the United States during the 1996-1997 academic year, more than 750,000 registered in e-learning.

### **3. PURPOSE STATEMENT**

The purpose of this formative program evaluation is to gain information concerning e-learning as an alternative to educate Saudi high school students. To this end, the researcher will (1) compare the academic performance of experimental students to those of the traditional students (the control group), and (2) determine the costs and benefits of such a program in the Kingdom of Saudi Arabia. This formative program evaluation is based on a Logic Model and cost benefit analysis and will allow the researcher to reach conclusion(s) based on the results. Additionally, this study will test the value of providing e-learning throughout the Kingdom of Saudi Arabia as an alternative educational system in an effort to cope with the large number of students who have not yet graduated from high school. The researcher anticipates that academic performance will match or exceed the performance of the control group.

### **4. IMPORTANCE OF THE STUDY**

E-learning as a delivery method can help the Kingdom of Saudi Arabia educate its children. E-learning as a high school educational delivery system will help the country succeed and provide excellent curricula to high school students in both cities and remote areas.

E-learning systems have increasingly improved and become one of the important educational delivery modes. Millions of students have finished their education through the e-learning education systems in many countries. In the United States, many students have earned their high school diplomas utilizing an e-learning system. Students have completed their high school requirements and have successfully competed in higher educational institutions [6]. However, no previous research concerning e-learning in Saudi Arabia has been conducted. It is very important to address this issue and provide Saudi Arabian officials and educators answers concerning the relationship in academic performance between students traditional classrooms and e-learners.

### **5. METHOD OF RESEARCH**

The methods used in this program evaluation to conduct research include a literature review, the introduction of a logic model, cost benefit analysis and research design. This is a qualitative research design. Two questions are addressed in this program evaluation: (1) Will e-learning students' academic performance compare or exceed that of traditional students; and (2) What does the Benefit-Cost Analysis reveal about a long-term, alternative high school delivery system for Saudi students?

### **6. LITERATURE REVIEW**

Higher education is entering a new era. "The use of technology has dramatically changed the pedagogical structure and notion of the classroom" [7]. Distance learning using the

Internet has proven an effective delivery system to meet the needs of an ever-changing student population [8]. Educators can use technology as either an amplifier or a transformer. Educators initially focused on Internet-based distance education to make existing practices more accessible and efficient. They attempted to “webify” the traditional face-to-face curriculum, resulting in an amplification of the existing practices. Additionally, educators have used technology as a transformer that enables changes in the way that learning takes place. “This is a lesson that the Information Systems community has learned over the years in the business community” [8], and is now being utilized in education.

Simply overlaying technology on top of existing processes yields little benefit. It was not until practitioners understood information technology in its appropriate role as an enabling tool for changing the fundamental processes that it was possible to finally realize its benefits [8]. This reengineering required that existing processes be discarded and reformulated, and to take a fresh approach with this new technology. Information System practitioners and researchers discovered that the real benefit of Internet technology lies in its ability to connect people who have common goals, thus creating a synergy that liberates the flow of knowledge. Information Systems have also discovered that the most important feature was not what can be captured and stored, but releasing tacit knowledge and multi-layered ideas that build from each dialogue within a social setting [8]. According to Grenzky and Maitland [6].

Online distance education has grown to become an important part of higher education. Millions of people have completed college courses online. Large numbers have earned degrees by taking advantage of these new educational opportunities. Increased access to a higher education in this form has allowed people living in rural areas, working professionals, military personnel in distant locations, and single parents with busy schedules to earn college credits. [6]

This shows that e-learning is an important technology that can help students in local, international, and rural areas earn their degrees without struggle by eliminating constraints such as those posed by time, distance, money, and material.

## **7. EVALUATION OF IMPLEMENTING AN E-LEARNING SYSTEM IN SAUDI ARABIA**

Any public program must consider all aspects to assess its value. A cost benefit analysis (CBA) is used as part of project evaluation techniques [9]. CBAs determine the effects of a proposed policy on society, benefits that are no more or no less than the aggregate of the effects on the individuals within the society. The use of CBAs has grown in popularity and plays an increasingly important role in government decision making. One reason may be that no other technique or tool provides a better analysis of intangible data into a financial representation to assist in a comprehensive, analytical approach to decision making. The measurements used to determine a cost - benefit assessment include Present Value and Public Value Analyses [9] costs and benefits are almost always expressed in terms of dollars and the benefits are most often intangible. Thus, the CBA is an attempt to put a price on these intangible benefits.

Present value is the value on a given date of a future payment or series of future payments, discounted to reflect the time value of money and other factors such as investment risk. Public Value Analysis (PVA) provides objective measurements that governments use to establish public policies. The creation of public value is essential for both the general public as well as governments in order to foster a better life for its citizens [9].

Unlike a private organization, motivated by a desire to maximize profit and reduce costs, a public organization focuses more on the effectiveness of its actions instead of efficiency. For these reasons, the planning department of public organizations should emphasize the sustainability of a given policy to establish a new public value, and the budgeting department should formulate the necessary budget not just to achieve a short-term result, but also to further improve the outcome [9]. The conception of a public value should become a belief, a standard, or even a theory of value rather than merely a comparison with past performance.

Just as an individual can positively affect his or her life by spending money wisely, policy makers should consider the importance of Present Value Analysis (PVA) when making public policy decisions. If this financial tool is neglected or calculated incorrectly, the result will be a project created on skewed or inaccurate data, and thus the public will not receive benefits from the project and the public administrator will not have done a good job for the people who pay tax dollars in hopes of receiving benefits.

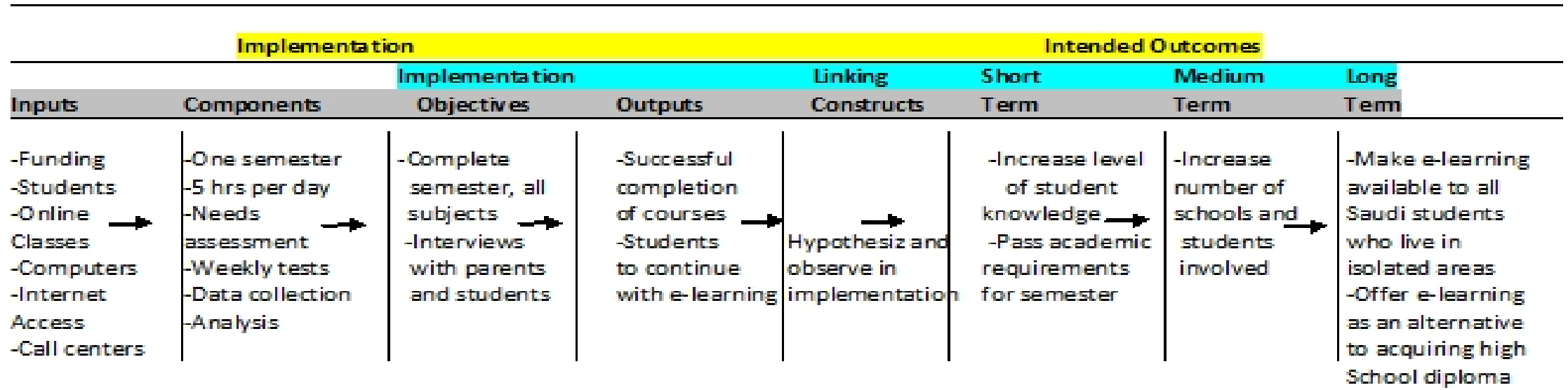
## **8. LOGIC MODEL**

E-learning has become popular at all levels of education for a number of reasons. The accessibility provides courses without the requirement of attending a physical classroom and helps establish self-scheduled, self-confidence, and self-paced schedules [1]. Public education in Saudi Arabia is considering a long-term plan for using Internet delivery along with learning in conventional classrooms. Therefore, this program will evaluate e-learning and distance learning as an alternative to the public education system. E-learning and distance education will create a new phenomenon in Saudi society and will allow the citizens an opportunity to take advantage of advancing technology. Minoli [4] notes that e-learning solves most of the problems universities currently face. For example, through the e-learning education, a great deal of remote-area classes can be established and giving numerous learners the advantage of college education. Therefore, e-learning reduces the difficulty of traveling and pursuing an education at the institutions. Additionally, it helps students from remote areas link to different sources of e-learning, such as student registration and the university library [4].

This program evaluation focuses on e-learning in Saudi Arabia's public education system. An early step in program evaluation is to develop a logic model. A logic model "describes how a program should work, presents the planned activities for the program, and focuses on anticipated outcomes" [10]. There are two areas of this in this logic model: Implementation and Intended Outcomes. These two categories are divided into Inputs, Components, Implementation Objectives, Outputs, Linking Construct, and three Intended Outcomes (Short, Medium, and Long Term).

**Logic Model:** The Inputs, Components, and Implementation Objectives involve 60 high school students in the control group that meets in a traditional teacher-centered classroom and 60 students in the experimental group that access their studies online from their own homes. Additional program inputs include the administrators and support staff of the high school where the program evaluation will take place. The time involved is one semester of e-learning in a traditional teacher-centered classroom or at home where students complete the entire curriculum. Sixty desktop computers with high-speed cable connection or lap-top computer with WiFi connection to the Internet are required. The Implementation Objective of this program evaluation is to make e-learning accessible for all subjects at home, and for children in isolated areas especially, but also for all students who wish to attend high school classes at home.

## E-Learning in Saudi's Public Education System Logic Model



The outputs focus on the successful completion of courses and receiving grades that will allow students to pass the courses studied during the program evaluation and to opt to continue with e-learning in future courses. The nationally-developed pre-test and post-test for both groups will be compared based on scores for all subjects between experimental and control students. A call center will be set up to assist experimental students with questions. At the end of the program evaluation, all students will complete a survey concerning their experience. The Linking Construct for this program evaluation is best stated as Temporal Asymmetry, which states that the variable that causes the effect precedes the variable that creates the effect and establishes a causal relationship between two variables.

“This tends to be treated at a conceptual level as well as an empirical level. We hypothesize Temporal Asymmetry, and then look for ways of observing it in our program implementation” [8].

The final section of the logic model is outcomes, which includes short-, medium-, and long-term intended outcomes. The purpose of this program is to determine if there is an increase in the level of student knowledge acquired through e-learning resources as compared to traditional, teacher-centered classrooms. One major long-term outcomes is to make e-learning available to all Saudi high school students who choose this form of education. However, program evaluation depends greatly on the professional judgment of the researcher. His or her professional judgment can be defined as “combining experience, which is influenced by beliefs, values and expectations, with evidence to construct findings, conclusions and recommendations in program evaluation” [8].

## **9. COST-BENEFIT ANALYSIS**

This Cost-Benefit Analysis see (Table 1) is conducted to determine if e-learning, or a computer-assisted instruction (CAI) program, can be justified as an alternative to teaching students in traditional classroom by comparing the cost of the program to the improved student accessibility to high school with the dollars spent. This program evaluates the first year of a four-year curriculum with 60 high school students enrolled in a traditional classroom setting for all courses as compared to 60 matched high school students enrolled in e-learning of the same material, However, the setting for the latter group is each student's home, where the student uses a laptop computer with access to the Internet.

More than 70% of the Saudi Arabian population is under the age of 30 [11]. The United Nations Educational, Scientific, and Cultural Organization [12] reports that in 2007, the number of intermediate and secondary students totaled 2,157,622. However, the teacher shortage is estimated to be as high as 75% [11]. As a result, the Kingdom of Saudi Arabia must import teachers from other nations to teach its children. The need to overcome the teacher shortage is urgent, and one suitable solution may be to explore the possibility of using CAI.

The purpose of this formative program evaluation is to determine the feasibility of allowing high school students to study at home rather than reporting to a traditional classroom based on a comparison of test scores with the control group and the CBA. It is anticipated that academic performance will match or exceed the performance of the control group.

**Table 1. Annual benefits of the program**

<b>\$'s in Thousands</b>	<b>Yr-1</b>	<b>Yr-2</b>	<b>Yr-3</b>	<b>Yr-4</b>	<b>Yr-5</b>	<b>Yr-6</b>	<b>Yr-7</b>	<b>Yr-8</b>	<b>Yr-9</b>	<b>Yr-10</b>	
<b>Direct Benefits</b>											<b>Totals</b>
reducee transportation costs	\$ 4,800	\$ 4,800	\$ 4,800	\$ 4,800							\$ 19,200
coasts of substute classes	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000							\$ 48,000
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	\$ 16,800	\$ 16,800	\$ 16,800	\$ 16,800	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 67,200
<b>Indirect Benefits</b>											<b>Totals</b>
support handycaps students	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000							\$ 240,000
overage student education	\$ 120,000	\$ 120,000	\$ 120,000	\$ 120,000							\$ 480,000
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<b>Total Benefits</b>	\$ 196,800	\$ 196,800	\$ 196,800	\$ 196,800	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 787,200



### **Benefits of the Program**

1. The drastic lack of high school teachers in the Saudi high school system creates a critical alternative requirement to education the children.
2. Increased educational opportunities will deepen the loyalty and prestige of this Kingdom among the other nations.
3. Increased educational opportunities will allow citizens to obtain positions in the sciences and mathematics within the country and on the international level.
4. E-learning will eradicate illiteracy.

Each of the benefits listed will greatly enhance Saudi Arabia's cultural and social prosperity.

### **10. COST OF THE PROGRAM**

The cost of an e-learning high school program conducted with 60 experimental students participating in high school studies at home compared to a control group of 60 students involved with the same course content in a traditional high school setting requires the following, as shown in Table 2 .

### **11. EVALUATION BASED ON RESOURCES, ACTIVITIS AND OUTPUTS**

**Question#1.** Will e-learning improve students' academic performance or allow them to exceed the academic performance of traditional students?

**Resources:** One month prior to the beginning of the school year, all equipment and supplies necessary to fulfill this program must be in place to accommodate the 60 experimental students in either group.

**Activities:** During the academic year, the experimental students will enroll in a government-sponsored e-learning program. The online courses will contain all the course content and tests required to fulfill the educational standards for each grade level. The tests will be administered online and the test scores will be stored in a database for comparison with the scores of members of the control group.

**Outcomes:** To achieve success, the one-year test scores of the control group studying in traditional classrooms, when compared to the experimental group of high school students studying by e-learning, should show no statistical significant difference, or show higher academic performance.

**Question#2.** What does the Cost- Benefits Analysis reveal about a long-term, alternative high school delivery system for Saudi students?

**Resources:** The funds for the four-year e-learning course of high school study will be paid from the Kingdom's Educational Fund. Additional funds will be allocated based on a positive result of this formative program evaluation. The first year cost of the program was \$309,600 for hardware and hardware related items, content, call center technicians, and staff members, as shown in Table 2. However, the first year benefits of the program are determined to be \$1,196,800, which indicates a significant benefit to the people of Saudi Arabia as sown in Table 3.

Table 2. Annual cost of the program

Direct Costs											Totals
laptops costs	\$ 60,000	\$ -	\$ -	\$ -							\$ 60,000
mintenance	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000							\$ 20,000
wi-fi setup	\$ 600	\$ 600	\$ 600	\$ 600							\$ 2,400
monthly fees	\$ 32,400	\$32,400	\$32,400	\$32,400							\$ 129,600
suplies	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000							\$ 4,000
eleamibg program for high school	\$ 30,000	\$ -	\$ -	\$ -							\$ 30,000
technical support for the program	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000							\$ 24,000
teachers overtime sallary	\$ 24,000	\$24,000	\$24,000	\$24,000							\$ 96,000
											\$ -
											\$ -
	\$ 159,000	\$ 69,000	\$ 69,000	\$ 69,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 366,000
Indirect Costs											Totals
license for support softwares	\$ 1,500	\$ -	\$ -	\$ -							\$ 1,500
overheads	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000							\$ 32,000
											\$ -
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	\$ 9,500	\$ 8,000	\$ 8,000	\$ 8,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 33,500
<b>Total Costs</b>	<b>\$ 168,500</b>	<b>\$ 77,000</b>	<b>\$ 77,000</b>	<b>\$ 77,000</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 399,500</b>

**Table 3. Cost-Benefit analysis**

<b>Opportunity Rate</b>	<b>8%</b>											
<b>Benefits \$'s in Thousands</b>	<b>NPV</b>	<b>Yr-1</b>	<b>Yr-2</b>	<b>Yr-3</b>	<b>Yr-4</b>	<b>Yr-5</b>	<b>Yr-6</b>	<b>Yr-7</b>	<b>Yr-8</b>	<b>Yr-9</b>	<b>Yr-10</b>	<b>Total</b>
reducee transportation costs	\$ 15,898.21	\$ 4,800.00	\$ 4,800.00	\$ 4,800.00	\$ 4,800.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 19,200.00
coasts of substute classes	\$ 39,745.52	\$ 12,000.00	\$ 12,000.00	\$ 12,000.00	\$ 12,000.00	-	-	-	-	-	-	48,000.00
support handycaps students	\$ 198,727.61	\$ 60,000.00	\$ 60,000.00	\$ 60,000.00	\$ 60,000.00	-	-	-	-	-	-	240,000.00
overage student education	\$ 397,455.22	\$ 120,000.00	\$ 120,000.00	\$ 120,000.00	\$ 120,000.00	-	-	-	-	-	-	480,000.00
	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total Benefits</b>	<b>651,827</b>	<b>\$ 196,800</b>	<b>\$ 196,800</b>	<b>\$ 196,800</b>	<b>\$ 196,800</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 787,200</b>
<b>Costs \$'s in Thousands</b>	<b>NPV</b>	<b>Yr-1</b>	<b>Yr-2</b>	<b>Yr-3</b>	<b>Yr-4</b>	<b>Yr-5</b>	<b>Yr-6</b>	<b>Yr-7</b>	<b>Yr-8</b>	<b>Yr-9</b>	<b>Yr-10</b>	<b>Total</b>
laptops coasts	\$ 60,000.00	\$ 60,000.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 60,000
mintenance	\$ 16,560.63	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	-	-	-	-	-	-	20,000.00
wi-fi setup	\$ 1,987.28	\$ 600.00	\$ 600.00	\$ 600.00	\$ 600.00	-	-	-	-	-	-	2,400.00
monthly fees	\$ 107,312.91	\$ 32,400.00	\$ 32,400.00	\$ 32,400.00	\$ 32,400.00	-	-	-	-	-	-	129,600.00
suplies	\$ 3,312.13	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00	\$ 1,000.00	-	-	-	-	-	-	4,000.0
elearnibg program for high school	\$ 27,777.78	\$ 30,000.00	\$ -	\$ -	\$ -	-	-	-	-	-	-	30,000.0
technical support for the program	\$ 19,872.76	\$ 6,000.00	\$ 6,000.00	\$ 6,000.00	\$ 6,000.00	-	-	-	-	-	-	24,000.0
teachers overtime sallary	\$ 79,491.04	\$ 24,000.00	\$ 24,000.00	\$ 24,000.00	\$ 24,000.00	-	-	-	-	-	-	96,000.0
license for support softwares	\$ 1,500.00	\$ 1,500.00	\$ -	\$ -	\$ -	-	-	-	-	-	-	1,500.0
overheads	\$ 32,000.00	\$ 8,000.00	\$ 8,000.00	\$ 8,000.00	\$ 8,000.00	-	-	-	-	-	-	32,000.0
<b>Total Costs</b>	<b>\$ 339,755.99</b>	<b>\$ 168,500.00</b>	<b>\$ 77,000.00</b>	<b>\$ 77,000.00</b>	<b>\$ 77,000.00</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 399,500</b>
<b>Net Benefits / (Costs)</b>	<b>\$ 312,070.57</b>	<b>\$ 28,300.00</b>	<b>\$ 119,800.00</b>	<b>\$ 119,800.00</b>	<b>\$ 119,800.00</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 387,700.00</b>
<b>Net Benefit/Cost (Ratio)</b>	<b>1.92:1</b>	<b>1.17:1</b>	<b>2.56:1</b>	<b>2.56:1</b>	<b>2.56:1</b>							<b>1.97:1</b>

## **12. CBA CALCULATIONS**

The NPV of a program must be higher than a ratio of 1:3 to be significant. The calculated NPV ratio for this present program is 1.97:1 The Opportunity Rate is the rate of return that can be earned on an alternative investment of similar risk. The estimated risk and uncertainty in deciding on the Opportunity Rate for the present study is 8%.

## **13. DISCUSSION**

### **Stakeholders and Win/Lose Scenario**

The win scenario of this formative program evaluation for an e-learning high school program indicates that all students will receive an excellent education by one of two delivery systems. The cost of the e-learning program is affordable, and the education provided is comparable to that offered by a traditional delivery system. The analysis of this program indicates that students, parents, the government, and society will all benefit from the continuation of e-learning public education system in Saudi Arabia. There is no discernible lose scenario in this formative program evaluation, except in the situation where the e-learning program does not produce the desired results.

Every modern country has a responsibility to educate its children. The Kingdom of Saudi Arabia is facing a crisis in providing educational facilities and teachers for the massive population under 30 years of age. An alternative to the traditional classroom was evaluated by this formative program evaluation and found to be a suitable solution. The one-year test scores of the control group studying in traditional classrooms when compared to the experimental group of high school students studying by e-learning will prove successful if that there no statistical significant difference (plus or minus 1%) exists in the field of academic performance, or if the capacity for learning among e-learners outpaces that of traditional learners. If this occurs, the CBA indicates that the benefits to society far outweigh the costs.

## **14. CONCLUSIONS**

Comparisons of academic tests scores between the control group and the experimental group for one year of course work will be successful if there is no statistical difference (plus or minus 1%) or a greater percentage between the two delivery methods. A CBA would determine that the benefits to society for implementing an alternative e-learning delivery system for high school study would be affordable. Therefore, the conclusion of this program evaluation would be to proceed with the program.

## **15. RECOMMENDATIONS**

If the findings and conclusions of this formative program evaluation show that the program is successful, it is recommended that the e-learning program for high school students in Saudi Arabia become an integral part of the public education system.

While this program evaluation only concerns students studying at home, it is possible to expand educational opportunities by including e-learning within existing school campuses, such as in a computer lab or in a traditional classroom equipped with computers where the teacher fills the position of facilitator, and is available for discussions and to answer questions.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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