



This project has been carried out with the support of the European Community. The content of this project does not necessarily reflect the position of the European Community, nor does it involve any responsibility on the part of the European Community.

QUIS

(QUality,
Interoperability and
Standards in e-learning)

Work Package 7

Cost Effectiveness and Cost Efficiency in E-learning

**In the perspective of the User,
the Provider and
the Society**



Quality, Interoperability and Standards in e-learning

Börje Hansson, Mid Sweden University
Tor Atle Hjeltnes, TISIP

Content

BACKGROUND.....	3
DISTANCE EDUCATION IN HISTORIC PERSPECTIVE	4
A CHANGING SOCIETY	4
NEW TECHNOLOGY	5
DEFINITIONS OF DISTANCE EDUCATION AND E-LEARNING	6
E-LEARNING/ WEB-BASED EDUCATION.....	6
DISTANCE LEARNING.....	7
COST EFFICIENCY AND COST EFFECTIVENESS	8
COST EFFICIENCY	8
COST EFFECTIVENESS	8
DISTANCE EDUCATION IN THE PARTICIPATING COUNTRIES.....	10
SWEDEN	10
OTHER	10
EARLIER STUDIES.....	10
FROM THE SOCIETY PERSPECTIVE.....	11
REASONS FOR SUBSIDIZING DEVELOPMENT OF E-LEARNING	11
<i>Cost effectiveness and cost efficiency</i>	14
DIFFERENCES IN THE PARTICIPATING COUNTRY'S	15
FROM THE INSTITUTION PERSPECTIVE	16
REASONS FOR DEVELOPING AND OFFERING E-LEARNING	16
<i>Pedagogic factors</i>	16
<i>Administrative</i>	17
<i>Economic</i>	17
DEMANDS ON THE INSTITUTION CONCERNING STAFF, TECHNOLOGY AND SUPPORT	20
<i>Courses vs. programs</i>	21
FROM THE STUDENT/COMPANY PERSPECTIVE.....	22
REASONS TO PARTICIPATE IN DISTANCE EDUCATION	22
EFFECTIVENESS FOR THE STUDENT	22
COSTS AND SAVINGS WITH DISTANCE EDUCATION.....	24
REASONS FOR LOW THROUGHPUT.....	24
SYSTEM COSTS	24
REFERENCES	25
APPENDIX A RELEVANT ARTICLES: E-LEARNING AND COST-EFFECTIVENESS	1

Background

The QUIS-project (QUality, Interoperability and Standards in e-learning) is a Transversal project in EUs eLearning Programme. The activities for the QUIS project are all directed towards Quality in e-learning, Interoperability and re-usability of e-learning material and development of standards. The project is also looking at cost effectiveness and cost efficiency in e-learning. The project is building on, and further developing results from earlier EU projects. The most important of these are the MENU project (2002-0510 / 001 - 001 EDU-ELEARN, <http://www.hsh.no/menu>), the MECA-ODL: Methodological Guide for Analyses of Quality in ODL delivered via Internet, (87901-CP-1-2000-1-ES-MINERVA-ODL), the GreTel Leonardo project (D/00/B/F/PP-112216) and the on-going Leonardo project, Newworkers (E/03/B/F/PP-149.035) and the ongoing Socrates Minerva project E-LEN (101421-CP-1-2002-CY-MINERVA-M)

Cost effectiveness and/or cost efficiency in e-learning and distance education is an important subject area. During the last decade there has been written quite a few articles and reports focusing on the cost of distance education related to effectiveness and efficiency. The focus is not always on e-learning, but distance education and computer based training (CBT) in general. The authors usually have a “narrow” perspective focusing either on, the user, the provider or the society when looking at effectiveness in e-learning. This is a potential problem for those who are going to implement these results when planning their future e-learning offering. When just focusing on one of the parts involved in the distance education and which impact cost effectiveness and cost efficiency will have on them, this most likely will lead to a solution which is not favourable for any of the parts involved, in the long run.

Another reason for focusing on cost-effectiveness in e-learning is the fact that this kind of education is getting more and more popular. Nearly everyone will be affected by this new way of getting information and knowledge. In most articles researchers and educators either focus on the technology or the pedagogy, forgetting the cost involved and the fact that somebody have to pay for it all.

Here in the first QUIS-project-report focusing on cost effectiveness and cost efficiency in e-learning. We have tried look at relevant case studies, articles and reports in this subject area. Further we have tried to describe the most relevant variables and factors affecting cost effectiveness and cost efficiency in e-learning, this in the perspective of both, the user, the provider and the society. We hope that this article will be an “easy” way to get a first overview of this rather complex subject area.

This first QUIS-project-report will be followed by another report where we hopefully will present our own model(s) for cost effectiveness in e-learning based on both a theoretical and a best practice approach. We do not want to look at distance education in general but at e-learning. In the area of e-learning the QUIS project partners have a lot of experience from EU-projects, research and from delivering education the last 20 years. We would like to look at our own success-model delivering e-learning and describe it focusing on cost-effectiveness and cost-efficiency for the user, the provider and the society. This work will be conducted in the next stage of the QUIS-project.

Distance education in historic perspective

Distance education has its roots in the early correspondence education in Lund in Sweden in 1833 and by Sir Isaac Pitman in England in 1840 (*Rumble*). Distance education has been seen as a good way to reach a large number of people who otherwise not would get any education. Thru early media like radio and television it was possible to reach large number of people at low cost per person due to economies of scale. A typical example could be radio education in India.

Another reason for the development of distance education is the fact that this kind of education makes it possible to get an education even if one can't show up in a classroom. An example of this could be the popular letter courses in the 1980s bought by people who lived in low populated areas of Norway.

Another reason for the development of distance education is the fact that most countries and governments have realized that well educated citizens are very important to become a civilized and developed country. Distance education has turned out to be a good solution to give education and knowledge to many people. Earlier it was an offer especially attractive to people living in the countryside, but with the introduction of new technology, distance education and now e-learning have become a realistic education alternative to almost every person.

In general there has been a development in the distance education from the earlier letter and text-based correspondence, thru radio- and TV-education, until the computer-based solutions introduced in the first part of the 90's. The continuing introduction of new technology has strongly affected the way distance education has developed in the last 50 years.

A changing society

Another important fact increasing the need for and the development of distance education and e-learning is the fast evolution of the technology and the society in general. These changes affect nearly all people living in developed countries. It does not matter if you are a travelling salesperson, a bank assistant or a rocket scientist, everyone need some kind of post school training or post graduate studies. The need to combine further education with job and family has been an important factor pushing forward the development of open and flexible distance education. Lifelong learning is a keyword.

“Peter Drucker, in book after book, beginning with Landmarks for Tomorrow (1959) and continuing through The New Realities (1989), kept reminding us that the centre of gravity in the employed workforce was shifting from those who worked with their muscles to those who worked with their minds (Fred Nickols 2000)”

Living in a knowledge- and information society can be quite demanding, both for the individuals, the organizations and the society in general. We live in the “computer age” and the letter “e” in electronic have become a natural part of our vocabulary (language).

E-mail, e-dating, e-business and e-learning are the future and there is no way we can ignore this if we want to take part in the modern society.

“Business as usual” is rapidly becoming a thing of the past – constant change and the pressure of competition are now the order of the day and providing learning solutions that work has moved up the agenda,” (Dennis R Quilter, 2000)

New technology

With the introduction of e-learning came many new challenges, but also great opportunities. Dealing with the challenges and at the same time utilizing the opportunities should be a goal for all of us. Introducing new technology just because it exists doesn't necessarily make any sense. It is important to do the changes for the right reasons and be aware of the impact the changes have on the society.

Thru the use of new technology it is possible for students, educators and learning providers to communicate and interact with each others in a much more flexible way than earlier. The focus on flexibility and new technology should never be at the sacrifice of the pedagogy and the quality of the learning. It is also important to focus on the cost of implementing and integrating the new technology in education. Introducing new technology in education or e-learning can be very expensive if we don't focus on the cost, the cost-effectiveness and the cost-efficiency. Another problem is that what might be cost-effective in the eyes of one interest group, turn out cost un-effective for another group. Here is an example.

A Norwegian university college (UC) decides to stop the class-room education in entrepreneurship and only offer web-based e-learning because it in the long run will be more cost-effective in the eyes of the UC. By introducing e-learning the UC can reduce the education staff in the area of entrepreneurship from four to only two teachers. The education provider is satisfied because they will save money. This looks like good business in a narrow perspective without considering the cost and the total satisfaction for the user and the society in general.

If introducing e-learning means that each of the students have to buy their own computer and get their own high-speed Internet access-point, the students might be less satisfied with the shifting to the e-learning course, even if they learn the same and it might be more flexible than classroom education. If introducing e-learning also results in the fact that less students in Norway choose to follow courses in entrepreneurship, this could be negative for the society in general. Entrepreneurship is important for the future development of the country.

In other words, this example solution with the introduction of e-learning was potentially cost effective for the provider, but cost “un-effective” for the user and the society. This on the other hand does not mean that introducing new technology can not be cost effective for all the parties involved.

“Historically, changes in educational structures have opened access for some groups while restricting access for others” (Ehrmann 1999).

Definitions of distance education and e-learning

Since we in this paper will look at earlier articles and reports focusing on the cost of distance education and e-learning we will start by giving you some definitions of distance education and e-learning.

Rumble and many other authors talk about distance learning in general. In this report we want to look at what we call e-learning. The concept of e-learning has become familiar during the last decade. E-learning is one way to go thru with distance learning, but distance learning does not have to involve e-learning.



e-learning/ web-based education

There are many different definitions of e-learning and web-based education. We can start by presenting a wide description of E-learning according to Wikipedia, the free encyclopedia.

“As opposed to the Computer Based Training of the 1980s, the term e-learning is most frequently used to refer to computer based training which incorporates technologies that support interactivity beyond what would be provided by a single computer.

E-learning, therefore, is an approach to facilitate and enhance learning through the use of devices based on both computer and communications technology. Such devices can include personal computers, CDROMs, Digital Television, P.D.A.s and Mobile Phones. Communications technology enables the use of the Internet, email, discussion forums, and collaborative software.

E-learning may also be used to support distance learning through the use of WANs (Wide area networks), and may also be considered to be a form of flexible learning where just-in-time learning is possible. Courses can be tailored to specific needs and asynchronous learning is possible. Where learning occurs exclusively online, this is called online education. When learning is distributed to mobile devices such as cell phones or PDAs, it is called M-learning.”

The Norwegian Research and Educational Network have the following definition of e-learning and web-based education:

“Learning who communicates thru different instruments (video, sound, text), who contains a certain degree of interactivity and are available thru the Internet.”

Another definition from the Elearning Europe initiative:

“e-learning: The use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration”

The concept of e-learning is quite new, and there are many definitions. The concept was probably born after the introduction of e-business or e-commerce, trading over the Internet. What most of the definitions have in common is the fact that they define e-learning to be, interactive learning who communicates thru different instruments using the Internet.

Distance learning

Distance education is a much older concept as we mentioned looking at the historic perspective. Many of the articles we have studied in the QUIS-project talk about distance education in general, not specially focusing on interactive learning over the Internet. We can look at some of the definition of distance education.

From Wikipedia, the free encyclopedia.

“Distance education is a method of teaching in which the students are not required to be physically present at a specific location during the term. (This is debatable as Coldewey's quadrants do allow for four different models of delivering distance education.) Most often, regular mail is used to send written material, videos, audiotapes, and CD-ROMs to the student and to turn in the exercises; nowadays e-mail, the Web, and video conferencing over broadband network connections are used as well. Often students are required to come to meetings at regional offices on specific weekends, for example to take exams. Distance education is offered at all levels, but is most frequently an option for university-level studies. Full time or part-time study is possible, but most students choose part-time study. Research study is possible as well.

Distance education is a newer term for correspondence courses, which arose from the need to provide schooling to students in remote, sparsely populated areas that could not support a school. Such courses are generally offered at the primary or secondary level, often with the students' parents supervising their education. While there are many "correspondence schools" that still offer a dull and lifeless form of DE, many colleges are now able to integrate dynamic learning that is interactive and engaging for the student.”

Another definition taken from a very good article written by (Brian Morgan, 2000):

“Distance learning is a type of education where students work on their own at home or at the office and communicate with faculty and other students via electronic mail, the WWW, electronic forums, videoconferencing and other forms of computer-based communication”

This definition is very close to the e-learning definitions we have looked at. This shows that e-learning can be distanced education, but the concept of distance education can be much broader.

Cost Efficiency and Cost effectiveness

Before we start looking at cost efficiency from different angles we should start by explaining the concept. In 1997 Greville Rumble published his book “The Cost and Economics of Open and Distance Learning”. This book looks at many of the factors controlling the cost in planning, developing and delivering Open and Distance education. The book is based on historical data, but still it is very relevant when looking at cost-efficiency and cost effectiveness in e-learning today.

Cost efficiency

This is what Rumble say about cost efficiency:

“Efficiency is the ratio of output to input. A system is cost efficient if, relative to another system, its outputs cost less per unit of input. A system increases its cost efficiency when it maintains output with less than proportionate increase in inputs. Efficiency can conveniently be divided into two components: allocative efficiency is concerned with the allocation of given resources between alternative uses in ways that maximize social welfare; x-efficiency is concerned with producing more output without any change in the allocation of inputs. It therefore focuses on inefficiencies such as overstaffing and managerial waste”

Another definition by <http://www.fundscope.com/glossary.asp>

“Cost Efficiency: this is a ratio of the excess return over a fund's benchmark, divided by management expenses. It calculates the value added (i.e. the excess over index returns) contributed by each percentage point of management expenses. A positive ratio would indicate that management expenses have a positive contribution and that the fund has "earned its fees".”

Cost effectiveness

We also want to look at the concept of cost effectiveness before we go into the perspective of the user the provider and the society. “Cost effectiveness” is a concept borrowed from the lexicon of economics, which is concerned with comparing different ways of achieving the same objective such that the most cost-effective choice will be the least costly of the alternatives being compared (Thomas and Martin, 1996).

Greville Rumble explains effectiveness in general this way:

“Effectiveness is concerned with outputs. An organization is effective to the extent that it produces outputs that are relevant to the needs and demands of its clients. This implies the existence of criteria by which the organizations success in this respect can be measured.

Schools can be effective but not necessarily efficient. For example, students can be taught programming very effectively, but if the cost of doing this is ten times the cost of any comparable programme, then it has not been very efficient.

Organizations need to be both efficient and effective. An organization is cost effective if its outputs are relevant to the needs and demands of clients and cost less than the outputs of other institutions that meet these criteria. Organizations that pursue efficiencies to the extent that the quality of the output is jeopardized or poor may cease to be effective.”

Jones (1989) suggests that any education system which seeks to make a meaningful measurement of cost-effectiveness must:

- describe the nature of the business in an objective way and establish a clear definition of the product
- determine the extent to which one is able to achieve the product aim, i.e. quantify the output of the production process, and
- establish the cost of the operation so that one can make some sort of measurement of the cost-effectiveness of the process by relating the extent of product success to the cost of achieving it.

(NG, 2000) states that it is important not to mix the concepts of efficiency and cost-effectiveness. It is possible for a programme to be efficient but not cost-effective if the outputs which are actually produced do not contribute to the programme objectives; that is it may be efficient at doing the wrong things

We can describe a strategy as cost effective if it is:

- less costly and at least as effective
- more costly and more effective with an added efficacy that is worth paying the additional price for
- less effective and less costly, where the additional cost of the alternative is too high for the additional benefits provided

It does not just mean the cheapest strategy.

In an article Lesh refers to findings done by (Moore et al 1990) looking at cost effectiveness and distance education.

“The weight of evidence that can be gathered from the literature points overwhelmingly to the conclusion that teaching and studying at a distance, especially that which uses interactive electronic telecommunications media, is effective, when effectiveness is measured by the achievement of learning, by the attitudes of students and teachers, and by cost effectiveness.”

There are different kinds of effectiveness, and cost effectiveness is only one of them. An area where there have been conducted much research is learning effectiveness. Learning effectiveness will in many cases be closely related to cost effectiveness. If a learning program is learning effective it has the potential of being cost effective. This depends on the cost and the learning efficiency. It is important to have this in mind looking at benefits from introducing e-learning for instance in higher education.



Distance education in the participating countries

Sweden

Since the middle of the 1990s, the number of students taking distance courses has risen more rapidly than the numbers taking courses thru classroom education on campus. This increase has been particularly strong the last few years. The creation of the Swedish Net University during 2002 has led to a major increase in both the range of courses offered and students following these courses. The Net University coordinates the courses offered with IT and web support by the higher education institutions. During the last academic year, the numbers of students taking distance courses rose by 40 per cent and extra impetus has been provided to expand the range of courses offered through the Net University, as the institutions receive more funding for these courses than for regular programmes and for other distance courses.

In 2003 the Swedish universities had 288 000 students on campus and approx 40 000 in distance educations. Distance students thus constitute 15 per cent of the total number of students in undergraduate programmes, but many of them combine distance studies with studies that require the normal form of attendance at an institution. The gender balance among distance students is more or less the same as for other students, i.e. about 60 per cent women, but distance students are older than students on regular programmes.

Other

Earlier studies

In order to examine earlier studies in the area, we made a thorough search in all academic resources for material containing the words “effectiveness” or “efficiency” together with “distance”. The search result was immense. After a quick browse we realized that reports written earlier than 1999 had little topicality value since the focus on the form of distributing the course has shifted towards e-learning and web based material. Developing of video or CD-ROM based courses are not relevant for this project. We therefore decide to use only material newer than 1999, with exceptions for some standard work. That left us with about 100 references. We indexed them after relevance and the list is found in Appendix A.

We found reports from Europe, America and Asia and it is interesting to notice a slight different focus in the different parts of the world reflecting different ways of organizing education. (unfinished chapter)



From the society perspective

Reasons for subsidizing development of e-learning

- **More education** - In general we can say that e-learning makes lifelong learning easier. As we stated earlier we live in a knowledge and information society. The whole economy is based upon rapid changes in the technology. If a company or a country is going to be able to compete in the global market, employees with up to date knowledge and education is a must. E-learning can be an effective way to educate people. With the latest e-learning solutions it is possible to acquire new knowledge and take part in “lifelong” learning while already being employed. More people getting access to education means a more educated society. Living in a knowledge and information society this is crucial.
- **Geographically obstacles** - E-learning can remove geographical barriers. With e-learning a student in Hong Kong can get a bachelor degree in Norway by following e-learning studies over the Internet. This is also the case within a country. For example, Norway is a geographically very long country with relatively few people per square meter. E-learning makes it possible for people living in remote areas to follow classes given by one of the Universities or UC in the bigger cities without physically moving there to study. This is important to prevent youngsters from moving into the big cities leaving the countryside unpopulated. In Norway, keeping the countryside populated is one of the official goals of the government.
- **Avoid costly duplication** - Every year billions and billions of Euros are spent on education. Most countries in the world see education just as important to the society as water is to us humans. When educators are spread around the country each of them serving their own geographical area, there will be an enormous duplication of studies throughout each country. This degree of duplication can be reduced by introducing e-learning. We can take an example from Norway. In Norway we have 26 public University Colleges spread throughout the country. A large number of these are offering their students a bachelor in Informatics. Each College University are subsidized from the Norwegian government to deliver these studies. Each UC develop their own material and have their own administration taking care of their Informatics students. An enormous amount of money is spent on duplicating material. By the use of e-learning and electronic material it should be possible to save money by sharing material. Another fact in Norway is that there are too many student “seats” in many educational areas compared with the numbers of students applying. By offering more studies using e-learning one didn’t have to offer the same studies locally at all the UCs. Not duplicating to many study programs at all the different UCs could potentially save the society a lot of money. Maybe the UCs who delivered the most cost-efficient and most cost-effective e-learning program could get the government money. The research on and the implementation and use of Learning

Objects (LO) are important when we are looking for new ways to enhance the reuse of learning material, and avoid costly material duplication.

- **Teacher time saving** - By introducing e-learning in higher education research show that education could be more time efficient. The professors and teachers then potentially get more available work-time to conduct research. This is very important if we want to develop our societies and have the ability to compete. By subsidising e-learning and the development of e-learning the society builds the foundation for harvesting time- and cost-effective benefits in the future. Making e-learning more time- and cost efficient than traditional classroom education is an ongoing job. The society providing money to support research on e-learning is helpful to speed up the process in finding the best e-learning solutions.
- **Student time saving** - The ability of reducing time spent on learning is not only favourable for the teachers and professors. Research has shown that e-learning can be time efficient also for the learner. There are several reasons why this is the case. One fact is that e-learning often is designed to let the learners decide what they need to learn and how much time they have to spend absorbing the relevant learning material. In traditional classroom courses the learner has to be present throughout the entire course even if he already has some of the knowledge being presented in the course. E-learning can be more efficient for the learner, letting him choose where to put his time and effort going thru the course material. By saving time in the learning process, the entire society will get more time being productive. Time means that we can produce more, and hopefully earn more money. E-learning being time efficient, can lead to the society being more cost efficient.
- **Potentially student adjusted** - E-learning can be useful in helping physically disabled people getting a better education offer. People who are sitting in a wheel chair or for other reasons have problem with travelling around, can get access to study programs through the Internet. By integrating the latest computer based tool when offering e-learning one can customise education to fit people who are weak-sighted or reduced hearing capabilities. Being able to offer an educational study program to as many people as possible should be in the society's best interest. Another group worth mentioning here are people with social anxiety. By following education over the Internet this could be a solution for people with social anxiety. They might not loose their anxiety, but they will become educated.



- **Higher recognition** - In most countries e-learning and net based education have become more and more popular. Still it's a fact that education taken over Internet and at a distance has not gotten the same status and acknowledgement as traditional campus education. There might be logical reasons for this looking at distance education in a historical perspective, but that should not be the case today. Therefore it is important that society subsidize the research and development of e-learning. High quality e-learning will ensure that the society will not be worse off even if e-learning will be the way to go in the future.
- **Global competitiveness** - Economists have the last five years talked about the "new economy". What makes the economy new is the fact that "the world is getting smaller". Thru Internet and other types of electronic communication most companies can get access to the global market. If we are to buy a book we can physically take the bus into the city and go to the bookstore, or we can access the Internet and order the book from Amazon.com.
Former geographical barriers disappear and we move from local to global competition. This has become reality in the commodity business and this could also be the case in the education industry. With the proper business models and the right e-learning solutions a national educational provider could offer education in an international market. Selling e-learning in an international market will become more and more common, and each society which wants to be an educational supplier should subsidise and invest in the development quality e-learning. Through this effort e-learning can also be helpful for countries getting a more international focus.
- **Technology updated** - In general we can say that subsidising e-learning is a good investment to make the society become more technology updated. The children of today are born with computers being a natural facility in the modern home. At young age children use the computer to play games and communicate with each other. For these children there will be no barriers relating to a computer as a helpful aid in receiving their education. In a computer society the society should support the evolution, and e-learning is a part of that evolution. Actually greater use of computers and technology in education is one the official intensions launched by most European governments.



Cost effectiveness and cost efficiency in the society perspective

In the society perspective it is important that the e-learning is worth the money. We can ask our selves if e-learning and net based education is learning and cost effective. The answer to this question is not easy, but from the arguments over we can see that there are many reasons to support the development of e-learning in the society perspective, and that most of them can be lead back to cost savings and/or increased effectiveness. When we are able to combine cost savings and better effectiveness in the eyes of both, the students, the institutions and the society in general, then we have a potentially good and cost effective e-learning model. Just by going thru the e-learning “cost effectiveness literature” we see the potential of e-learning being cost effective in a society perspective.



Differences in the participating country's

The educational systems differ greatly between countries, mainly for historical reasons. Despite several mutual EU-projects the organization of education still differs within the EU. There are differences when it comes to type of exam, what gives credit points, intake at schools and financing. There are great differences when it comes to subsidizing, both for students and the educating institution. It is not without problems for a student from one country to continue his/her studies in another country without often having to take part in supplementary examination and going through a lot of bureaucracy and extra time spent. This extra time and effort leads to extra costs for students, the educating institution and the society.

This part of the QUIS-project has a goal to create a complete model for cost effective and cost efficient e-learning. In doing this studying economical factors are important. It is a big challenge for us considering the differences between the countries.

There are also difficulties within each country. We can look at one example from Sweden where the universities are getting paid for every enrolled student.

- In Sweden all studies are free of charge for the student. That result in students signing up for more courses than the ever planned or are able to finish.
- The student is entitled to apply for full study support for distance courses, even if many of the students chose not to do this.
- The university are fully paid for each enrolled student (year 2005): 4 253 SEK (470 EURO). After completed course the university in addition gets: 4 440 SEK (490 EURO). This means that it is good business to have lot of students enrol even if they don't finish the course.
- In addition to this money, the university (this year) receives extra founding for creating new distance courses with 4000 SEK (440 EURO) per enrolled student in distance education courses listed at the Swedish Net University.

All policies above can rapidly change for political reasons, and therefore it's difficult to make long term plans. If we want to compare cost efficiency and cost effectiveness between different types of learning in the society perspective there are many general and country specific factors that need to be considered.

From the institution/provider perspective

Reasons for developing and offering e-learning

There are many reasons why educational institutions should develop and offer distance education and e-learning. Some reasons are administrative, some reasons are pedagogical and some are economical. An interesting thing is that nearly all the reasons will affect and influence on the quality of the education being provided to the end user. High quality education is often similar with learning-effective education and that's very positive for the student, the educating institution and the society in general. An education study program which are learning effective and learning efficient are also likely to be cost efficient and cost effective. Many of these factors that we are looking at can be closely linked together in a positive way. This is why it is very important to consider the different reasons for developing e-learning in more than one perspective. Now let us look at the institutions perspective. We have chosen to divide the reasons for developing and offering e-learning into three, pedagogy, administration and economy, even though they are closely related.

Pedagogic factors

- **Interactivity** - E-learning can make the teaching more learning centred. Lectures are replaced with a variety of learning resources that move students from a passive, note-taking role to an active, learning orientation. Interactive programs and on-demand help functions have proven to be positive in engaging students in their learning process. This does not mean that just by defining a course to be e-learning, the students will be more engaged. As we all know there are great differences when it comes to good and not so lectures, there are also great differences in e-learning. To develop an effective e-learning course it takes quite a lot of effort. There are many factors involved both technological, pedagogical.
- **Communication** - One of the most important factors involved in e-learning is communication. Thru the use of technology it is possible enhance student-student and student-teacher communication. E-learning technology enables both synchronous and a-synchronous communication.
- **1 to 1 student time** - With online learning the instructor gets more time to spend on each individual student. Letting the students follow a more or less pre defined and pre developed e-learning course on the Internet, the learning instructor can use more of his time to directly guide and communicate with each student individually. (Morgan)
- **“natural progress”** - If the e-learning course is pre-defined and module-based, this kind of learning can make it possible for each student to have their own “natural” progress. This is positive both when it comes to student learning, and the flexibility in the student progress. Each student can optimize his learning, and the learning institution will hopefully achieve a better overall student result. (Morgan)

Administrative

- **Greater Flexibility** - Flexibility in times and space, it is not just the students who can have a larger degree of freedom following an e-learning course. The teacher, the teacher supervisor and the administrative staff will also get greater flexibility when supporting and administering the students. The administrative staff can monitor students and make automatic student handling systems.
- **Better administration** - The use of Learning Management Systems (LMS) in e-learning have proven to be very to be a positive tool when it comes to student administration and student monitoring. Thru e-learning and the use of LMS the learning institution can follow the activity of their students, supporting and guiding them to a better result. By integrating different student administrative and learning system the administrative staff at the learning institution is better able to do their job more effectively, providing the students better service. A positive thing about e-learning is the fact that we can log and trace activities going on in the e-learning environment. These data can help us calculate and compare e-learning with other types of educational methods.
- **Removing geographical barriers** - The introduction of e-learning has to a larger extent made it possible for the learning institutions to offer their courses at a low cost outside the institutions near by area. For the administrative staff there will be no significant difference in serving students located on or off the campus area. They will all be integrated in the same systems, and the monitoring and communication will take place over the Internet (ex. The LMS).



Economic

As we can see there are many reasons why learning institutions should deliver their courses thru e-learning. In education in general there is never “enough” money. This meaning that there always has to be compromises when a teacher or a professor are developing and lecturing a course. E-learning can be positive when it comes to save money or reduce the overall cost. We can look at some reasons why this is the case.

National competitiveness

- **Less student/teacher time** - Looking at e-learning in the society perspective we said that e-learning could give the teachers more time to spend on research and other activities. If the institution choose to use this time to educate even more students, this could mean that the institution could reduce their staff or enrol more student. This means that the institution will either save or earn money. It is important to note that if the students learn less due to the shifting from classroom to e-learning, this solution may not be cost efficient.

- **Replace expansive labour hours** - Another potential positive and money saving effect by introducing e-learning is the possibility to replace expansive labour hours. Traditional classroom courses were often fully development and administrated by the teachers and professors. When developing, running and administrating e-learning courses one can involve different kinds of staff and even students can contribute. This could lead to the saving of money. Another positive thing about this is the fact that the different group of employees get to do what they are best at. The teacher can focus on presenting the facts, the computer guru can work on the interface and the administrative people can take care of registration and enrolments. Doing what we are best at saves time, we don't have to waste resources in duplicating the different specialist knowledge and skills.
- **Economy of scale** - When looking at e-learning and cost we always have to consider the "economy of scale". Bassi (2000, Weller) claims "the economies of e-learning are highly dependent on the number of learners involved. The greater the number of learners, the greater the probability that economies of scale will make e-learning an attractive proposition from a cost perspective". The reasoning behind that statement is the fact that e-learning can be of high quality and still require low levels of student support. (Weller, 2000) states that: "The traditional distance education technologies have high fixed costs, but relatively low variable costs". To get down the overall cost per student, a large student number would be preferable. In an article by Morgan he comments that: *Inglis (1999) notes that by increasing student intake, one could achieve a greater economy of scale and reduce the overall costs per student.* Knowing this, it is a good thing that e-learning could be offered to almost anyone independent of where they live. Educational institutions can address a large market or target group after having invested high "fixed" costs in developing an e-learning course. Thru the use of e-learning, the learning institutions can attract students from outside the area they are geographically located. This increases the possibility to get "enough" students and achieve higher income and economy of scale.
- **Re-use and modularization** - Learning objects (LO) and reuse of learning material can be an important benefit from the institutions developing of e-learning. LO will help us reduce the fixed cost by four means: reuse, rapid production, ease of updating and cost effective pedagogy. The SCORM standard defines LO this way: "a portion of a course packaged with sufficient information to be reusable, accessible, interoperable and durable" and the definition by (Wiley 2000) : "any digital resource that can be reused to support learning". We can see that both definitions focus on the LOs ability to be reused in learning. The reuse makes us save money since we do not have to build everything from scratch every time we want to offer a new e-learning course. Using LOs who are modules of facts we can reuse material and this helps us divide the expenses over several different courses. Another important fact is that most e-learning courses can be offered to students over several semesters without major changes. We can refer to what Tomas and Martin said in 1996 (NG): "the concept of cost-effectiveness is concerned with comparing different ways of achieving the same objective such

that the most cost-effective choice will be the least costly of the alternatives being compared.” With high quality module based e-learning material and economy of scale, e-learning appear to be cost saving and hopefully cost effective.

We have to say **appear** to be cost effective, because measuring effectiveness is not an easy task, something NG also points out:

“Deciding which outcomes should be assessed for effectiveness involves value judgement and often exposes conflicts of values. Moreover, in education, the outcome of the learning process is not quantifiably measurable in most cases, while there is no single objective criterion to use in measuring or comparing performance.”

- **Classrooms and computers** - In many ways we can say that it is the capabilities provided by the information technology that helps us achieve many of the benefits from e-learning. For example students following e-learning courses of campus save the institution considerable costs when the institution do not have to get hold of classrooms for lecturing and access to student laboratory computers.



Demands on the institution concerning staff, technology and support

There exists plenty of research looking at which factors we have to consider developing and offering e-learning (distance education). There are many potential obstacles and pitfalls we should try to avoid. Here are some important ones.

High throughput not the same as efficiency

On faculty level there have turned out to some problems adapting to the new situation with an increasing percentage e-learning courses. The traditional way of allocating resources and evaluate results cease to function when there are no traditional face to face lecture hours, laboratory groups or computer laboratories. It is easy to think of e-learning and distance education, without any of these resources, as a cheap way to offer education. This is a dangerous thought since recent research shows that there is an obvious risk that the work done by teachers and instructors are becoming underrated. The demands on teaching personals time and the need to communicate with the students are still there even if courses are offered by e-learning and distance education.

There are problems both in the system and with the administrative personal. Focus in the universities lies mainly in research and producing postgraduate students. This process depends on a close relation between researchers and students witch is considered difficult to achieve in distance education and e-learning. Since many of the distance courses are used for further education/life long learning they are not as highly respected, unless they can be used for saving money. The lack of “respect” is also present among administrative personal, which are mostly recruited within the university itself and therefore embrace the same ideas.

It's important to make the right decisions regarding suitable form of education for different situations to attain high effectiveness and high efficiency. It is vital to understand and be able to evaluate the pro and cons of e-learning and to understand the difference and similarities between traditional education and e-learning.

Little pedagogic knowledge on e-learning courses

To often the teachers in higher education are not recruited for pedagogic skill, but rather their present or future contribution to research. The teachers have little knowledge about how students learn and therefore no sound strategy for how to create good courses. Susceptible teachers use trial and error and hope they will get it right sooner or later. The same non-pedagogy is used when they are supposed to transform their classroom courses into e-learning courses. This is often an even bigger challenge if they have little experience with new e-learning environments themselves.

The demand for the teacher to get more pedagogic knowledge will increase as there is a new kind of students taking distance e-learning courses. The students are older, more targeted and often with former higher education. These students will not accept badly prepared courses or teachers that are hard to reach.

Support for new technologies

Teacher as well as students in e-learning becomes more dependent on serviceable computer and network systems. Instead of a lot of computers at campus which are consuming resources for purchase, management and administrating, they need servers, programs and network. E-learning also demands for certain accessibility to computers around the countries. The future technical platform must be directed towards mobile students using distributed resources.

Technical support departments are adjusted to support on campus activities, but with an increasing amount of e-learning the demands will shift focus to more support for ICT-systems and other software support.

Costs for developing, administrating and running distance education

The actual cost for develop a distance course are often underestimated or rather the possibility to save money are overestimated. The educating institutions hope that the transferring from an on campus course to e-learning will yield good money. The problem is that this can manifests itself in little resources allocated for the actual transferring and reduced resources for running the new course.

Sometimes e-learning courses can save money but some current research proof this to be just a dream. Instead you risk ending up with e-learning courses with low quality and throughput and worn-out teachers. It is important that the educating institutions realize that producing and delivering high quality e-learning really takes an effort. There are potential savings and e-learning can turn out to be more cost-effective, but achieving this is a challenge. Considering the reasons for developing and offering e-learning that we have presented here is a good start. Now we will look at e-learning and cost effectiveness in from the student perspective.

Courses vs. programs

(unfinished chapter)

From the student/company perspective

There is a lot of research about distance education regarding pedagogic, didactic and economic questions but only a few from the student's perspective and none concerning effectiveness and efficiency from the student's perspective.

Reasons to participate in distance education

At Mid Sweden University, department of Information Technology and Media we have done continuous (2000 – 2005) research on our distance students. The research involves questionnaires to the students focusing on their study situation and how they experience the different courses, combined with our own statistics on their results. What we tried to figure out was why they didn't finish their courses even though they say they like the content and the web based environment (the report is being published late 2005).

Preliminary results show the difference between on-campus and distance students. It turns out that the distance students in general are older, are more socially rooted, often have work and family and are resident. In our study 50 % said they were working or searching for work, and 75 % said that they wouldn't have been able to study if they had to travel to the university. They also said that one of the main reasons for studying by e-learning was the fact that they more or less could study at their own pace.

About 50 % of the e-learning students said that the e-learning courses were further education and that they choose courses that match their present or future profession. Some of the student followed a course to get a certificate matching their present knowledge making them more competitive in search of work. A small portion said that they choose distance courses because this would help them get a degree in reduced time compared with traditional education.

Only a couple of our distance students had applied for study allowances.

Effectiveness for the student

There are a few reports on students study result comparing on-campus and distance students. Some can't find any differences but *Debbie Johnson et al* divided a class into two groups and gave one of them, in addition to traditional lectures, web based instructions and support. The results were better but still unclear and the people behind the article could not say for sure that the web based solution in it self caused the better scores. Debbie Johnson et al, 2002 COMPARISON OF INTERNET AND TRADITIONAL CLASSROOM INSTRUCTION IN A CONSUMER ECONOMICS COURSE.

The results of the study indicate that the online students scored significantly higher than those students in the traditional classroom setting on the post-test, even after controlling for significant pre-test differences. One reason might be that the students in the online course reported that they spent 6-10 hours per week working on the course while the traditional classroom students reported working only 5 hours per week or less.

...online method of instruction places more of the responsibility for learning on the student.

It is difficult to compare different distance courses regarding effectiveness since they are so varying concerning student support, web material, level, target group and so on and even more so trying to compare on campus and distance courses. Besides that they obviously attract different kind of students.

(unfinished chapter)

(Not just students, also companies and other organizations buying or using e-learning.)

(unfinished chapter)



Costs and savings with distance education

The evident savings both on short and long term for a student taking distance courses are the possibility to work besides study and not have to travel.

Reasons for low throughput

In spite of the students positive views on distance education the courses tend to have larger dropout rate. This is common in many studies. In our study the students put the blame on themselves: “things happened”, “I underestimated the amount of work” etc. Trying to combine study and work can result in a conflict and it is difficult for students to estimate the amount of time to spend on the studies. A firmer control and more demands on student activities might lead to the fact that some students work harder to keep dead lines, while other students would not apply for the course because they would lose much appreciated freedom.

Examination

To examine a distance course thru a web based examination are most favoured by the students. Besides problem with travels many of the older students find written examinations on campus being old-fashioned.

Type of support from teacher/others

(unfinished chapter)

Pedagogy

(unfinished chapter)

Student access and student learning (TCM)

(unfinished chapter)

System costs

(unfinished chapter)

References

Rumble, The Cost and Economics of Open and Distance Learning

Fred Nickols 2000

Dennis R Quilter, 2000

Ehrmann 1999

Brian Morgan, 2000

Thomas and Martin, 1996

Tomas and Martin said in 1996 (NG

Jones (1989)

NG, 2000

Moore et al 1990

Bassi (2000, Weller)

Wiley 2000

Mid Sweden University

Debbie Johnson, Michael Burnett, Peggy Rolling. COMPARISON OF INTERNET AND TRADITIONAL CLASSROOM INSTRUCTION IN A CONSUMER ECONOMICS COURSE. Journal of Family and Consumer Sciences Education, Vol. 20, No. 2, Fall/Winter 2002

<http://www.fundscope.com/glossary.asp>

Appendix A

Relevant articles: e-learning and cost-effectiveness

Author	Name	Relevance	Year	Subject
Carol A. Twigg	New models for online-learning	***	2003	Summarize a project in universities about how to redesign instruction using technology to achieve quality enhancements as well as cost savings. Presentation of 5 different course design models, from classroom to stand alone e-learning.
Thomas Taylor, G.D. Parker, Elizabeth Tebeaux	Confronting cost and pricing issues (in distance education)	**	2001	Looking at how universities can stipulate costs in e-learning/distance education, and how to set the correct prices, both to students and other universities. Analogous TISIP delivering courses to MIUN.
Martin Weller	Learning objects and the e-learning cost dilemma	****()	2004	How to reduce cost in e-learning using learning objects (LO) . LO will help us reduce the fixed cost by four means: reuse, rapid production, ease of updating and cost effective pedagogy. Looking at the fact that: most educators have quickly discovered that simply transferring their teaching approach from one medium to the other is not effective. LO and reuse. Argues that LO and activity-based pedagogy is a good combination.
Kwok-Chi Ng	Cost and effectiveness of online courses (in distance education)	*****	2000	This is a relevant and really good paper for the QUIS-project. It discusses cost-effectiveness, focusing particularly on online courses in open and distance learning. The concept of cost-effectiveness is discussed, focusing on using online technology. The author uses a project example from the Open University of Hong Kong as an illustrative example. The author uses many relevant references for the cost/distance learning literature. Very well written!
	Calculating the Cost of Online Courses.			http://www.marshall.edu/distance/
Jay Buzhardt and George Semb	Computers in teaching	***(*)	2005	Integrating online instruction in a college classroom to improve cost effectiveness. Comparing online study guides to pen and paper study guides in terms of academic performance, the amount of time instructors spent grading study guides, and student preferences. The article shows that integrating online study guides saved labour costs and increased student satisfaction while maintaining student performance. Some cost history. Says that there is money to save by going online.
Lesh and Rampp	Effectiveness of computer based educational	****	2000	The article present an introduction to the arguments for and against the use of recent advances in computer-assisted distance instruction, and to provide a thorough review of the current literature related to the effectiveness of learning at a distance through a

	technology in distance learning: a review of the literature			technologically enhanced medium. Focus (distance learning and Kirkpatrick). Looks at the factor (media) which have the greatest impact on student satisfaction and learning. Useful review of literature. Good conclusion.
Ernst Z. Rothkopf	Cost of asynchronous distance ventures	**	2001	A simple mathematical model is described which provides estimation procedures for comparing college-level, distance teaching costs with on-campus operations. (focuses on asynchronous content distribution).
WCET - the Western Cooperative for Educational Telecommunications http://www.wcet.info/about/	The technology costing methodology project	Project web site **** USA	1998-2002	TCM Handbook Jones 2001 Looks at the costs of expanded use of electronic IT as a means of delivering instruction. The TCM handbook provides a comprehensive set of assumptions, principles, and procedures for calculating the costs of courses that are delivered by various forms of electronic technology as well as by traditional classroom methods. Focusing on the costs of a single course . Builds on Bates and Rumble)
Ruth Clark	Six Principles of effective e-Learning: What works and why	***	2002	How best to arrange e-learning to get the best learning results. Not looking at costs, but looking at learning outcome.
Fred Nickols	Evaluating training: There is no cookbook approach	***	2000	How and why evaluate training (education). Kirkpatrick level one and so on. Some training evaluation history. Good conclusion
Kevin Kruse	Measuring the total cost of e-learning	***	2002 eLearning guru.com	The article describes most of the direct and indirect costs that make up the true cost associated with training program. Cost comparison between instructor led and technology-based training. TBT is best for large groups. See example
Dennis R Quilter	A panacea or a culture change	Sitat	2000	
Frank L Greenagel	ED472220 The illusion of e-learning		2002	Critics about the way many providers have become to use e-learning. Negative, but interesting.

Jeffrey Berk	The eLearning developers journal – It's not how much you train but how well	***+	2003	Looking at how we can focus training measurement on how well we train instead of how much. Activity measures vs. performance measures. List with performance measures. Focus on Kirkpatricks four levels of training evaluation. Level five from Dr Jack Philips ROI. Three models for measurement solutions, Learner, Manager and analyst based.
Stephen Ehrmann	Evaluating benefits of educational uses of technology	****+	2002	How to asses benefits from introducing technology.
John Opper and J.B. Mathews	Funding and cost containment of educational technology	***	2002	Looking at cost involved with the new kind of education. Technology based. List over funding and cost containment strategies p 8 and 9.
Dennis Jones	The transformation of Instruction by information technology	*** Better for WP 8.	2002	How to better make use of the technology in education. Implications for public policy.
Boverie, sanchez Mulcahy and Zondlo	Evaluating the Effectiveness of training Programs	**	Before 2000	General factors affecting adult education, + Kirkpatrick
Darin E. Hartly	E-valuation: Pricing E-learning	***+	2001	How to price e-learning. Common approaches for pricing of e-learning, Per seat, one time flat, pay as you go, per server, free, payment based on time
Lockee, Moore, Burton	Mearsuring Success: Evaluation Strategies for DE		2002	Looks at formative and summative evaluation.