

The e-learning movement as a process of quality improvement in education

Christiana Th. Nicolaou, Iolile Nicolaidou, Constantinos Constantinou

► **To cite this version:**

Christiana Th. Nicolaou, Iolile Nicolaidou, Constantinos Constantinou. The e-learning movement as a process of quality improvement in education. Sixth International Conference on Computer Based Learning in Science (CBLIS 2003), 5-10 July 2003, 2003, Nicosia, Cyprus. 12 p. hal-00197343

HAL Id: hal-00197343

<https://telearn.archives-ouvertes.fr/hal-00197343>

Submitted on 14 Dec 2007

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Nicolaou, C ., Nicolaidou, I. & Constantinou, C. P. (2003). The e-learning movement as a process of quality improvement in education. Sixth International Conference on Computer Based Learning in Science, CBLIS 2003, Nicosia, Cyprus, 5-10 July 2003.

THE E-LEARNING MOVEMENT AS A PROCESS OF QUALITY IMPROVEMENT IN EDUCATION: THE CASE OF THE UNIVERSITY OF CYPRUS

Christiana Th. Nicolaou, Iolie Nicolaidou, and Constantinos P. Constantinou
Learning in Physics Group
University of Cyprus

ABSTRACT

Quality in education has been regognized as an issue that should guide our efforts for improvement for many years. eLearning is the latest attempt to take advantage of developments in technology to improve learning. In this paper, we discuss the possibility of establishing a theory of elearning, the value of design patterns, and the possible scenarios of implementation by higher education institutions attempting to use new technologies in their courses of study. A survey concerning the elearning paradigm that was conducted at the University of Cyprus (UCY) at the beginning of the spring semester 2003 is presented. The main purpose of this survey was to report on the views and experiences of the UCY students and faculty members regarding elearning implementation in university courses. Data collection was accomplished through a specially designed questionnaire administered to 1938 students and 46 faculty members. Ten faculty members were also interviewed for more in-depth analysis. Based on the results of the survey, we propose a series of possible actions which could form the basis for developing a vital elearning policy through continuous improvement of the university's teaching program.

KEYWORDS

elearning, new technologies, design patterns, theory of elearning.

INTRODUCTION

Quality in education has been regognized as an issue that should guide our efforts for improvement for many years. For a long time, international evaluation have demonstrated repeatedly that the quality of learning in our educational system is well below expectations (Mullis et al, 1997, Mullis et al, 2003). With or without new technologies, educational institutions need to innovate on means to achieve the required step up in the quality of education.

eLearning is the latest attempt to take advantage of developments in technology to improve learning (Thomson, 2000). It seems that there is optimism for renewed potential due to developments in networking technology which introduce new possibilities in communication. However, we should take into account that there is a long tradition of failed attempts to reform the processes of teaching through the introduction of technological innovations (eg. Radio, TV, programmed learning) with the purpose to enhance the quality of learning (Means and Olson, 1994).

Despite the fact that the history of educational reform indicates a series of failed attempts, there are certain parameters that justify renewed optimism in the case of elearning:

1. Networking technologies provide sophisticated communication capabilities, that are better tuned to the requirements of teaching and learning.
2. The learning sciences have a better grasp of requirements and potentialities offered by technological solutions.
3. Empirical research tools can support the process of implementation through more authentic evaluation of actual learning outcomes.
4. There is enhanced teacher awareness of the need for dramatic improvements in order to achieve better quality in education.

Hence, the elearning paradigm has potential in serving as a mechanism for undertaking the required quality leap in education. However, if it is to make a long-standing impact on educational institutions, the elearning movement will need to take into account all aspects of our understanding of how learning is facilitated, organized and evaluated. To maximize this impact: (a) ongoing advances at the network infrastructure level need to continue to provide the required improvements in bandwidth for live multimedia communication; (b) the development of alternative elearning platforms need to provide the necessary software resources for interaction, knowledge organization, visualization and modeling tools; and, finally, (c) the design of online activity sequences needs to promote meaningful construction of knowledge and demonstrable learning competencies.

In order for these lines of development to take place in an effective manner, we need to rely on: (a) robust design, which will ensure that the learning environment is organized and structured according to current pedagogical principles, and (b) carefully designed research, whose outcomes can be invaluable for both designers and educators involved in the development of learning environments.

In the first part of this paper, we discuss the possibility of establishing a theory of elearning, the value of design patterns, and the possible scenarios of implementation by higher education institutions attempting to use new technologies in their courses of study. In the second part, we describe a survey concerning the students' and faculty members' needs for elearning, conducted at the University of Cyprus (UCY) at the beginning of the spring semester 2003. The main purpose of the survey was to report on the views and experiences of the students and faculty members regarding elearning implementation in university courses. Finally, based on the results of the survey, we propose a series of possible actions which could form the basis for developing a vital elearning policy through continuous improvement of the university's teaching program.

THEORETICAL BACKGROUND

Towards a theory for elearning?

For the purpose of this paper, we take the view that elearning is the use of new multimedia technologies and the Internet to improve the quality learning by facilitating access to resources and services, as well as remote exchanges and collaboration (European Union, 2003). In the last few years, several attempts have been made to develop a common language of elearning. This common language could constitute the basis of the formulation of an elearning theory. In this context, a number of basic concepts have been formulated as follows:

Learning object: a digital file or tool that can be used repeatedly in networked learning environments.

Online learning: describes education that occurs through the Web, that is, it does not involve any physical learning materials nor does it involve face to face contact. Pure online learning essentially amounts to the use of elearning tools in a distance education mode using the Web as the sole medium for all student learning and teacher-student or student-student contact.

Mixed-mode or blended or resource-based learning: an approach that combines face to face and distance approaches in education. According to this learning mode, a teacher meets with students (either in a face to face interaction or through computer mediated communication) and at the same time provides a resource base of reference material and learning activities for them.

Learning Management System (LMS): a collection of elearning tools available through a shared administrative interface. An LMS can be thought of as the software platform in which online courses or online components of courses are assembled and used.

Indicative interactivity is the type of interactivity that enables students to learn from their own choices in a way that provides some form of feedback. It is typified by the use of button rollovers and site navigation (e.g. clicking a button to start an animation or turn the page).

Simulative interactivity is the type of interactivity that requires the user's involvement in realistic virtual environments (e.g. flight of a virtual plane, virtual field trips)

(Nichols, 2003, p.2)

The usefulness of these concepts lies in the fact that they provide a context and tools for debate, and further stimulate the discussion around the idea of forming an elearning paradigm. Along the same lines, Ravenscroft (2001) remarks that "given that the pace of change of educational technology is unlikely to slow down, the need for relatively more stable and theoretically founded interaction models is becoming increasingly important." The more discourse develops about a common language for elearning, the more prepared practitioners will be for the implementation of an elearning theory.

Design Patterns

Parallel to the need for the formulation of an elearning theory, emerged the need for the development of design patterns in this field. According to Alexander et al. (1977) each pattern describes a problem which occurs repeatedly in an environment and then the core of its solution in such a way that the user has the ability to implement this solution repeatedly in different contexts. What is unique concerning patterns is their ability to explain the rationale for developing the solution (the "why") in addition to describing the solution (the "how"). A key contributor to this attribute is the structure of the pattern¹.

Some of the fields that have adopted patterns are: computer science (Gamma et al., 1994), software architecture (Buschmann et al., 1996; Schmidt et al., 2000), hypermedia engineering (Rossi et al., 1996), object-oriented analysis (Fowler, 1996) and e-business patterns. Nowadays, several attempts are being made which aim to the introduction of the idea of design patterns in the elearning area (e.g. E-LEN project).

Patterns are all about reusability, which seems to be the keyword in achieving the economies of scale for constructing and implementing elearning courses. Reuse in the form of analysis, design, or architectural patterns, is more important than simple code reuse (Avgeriou et al, 2003; Rossi et al, 1997; Ericsson & Penker, 2000). A further advantage that patterns promote is independence of methodologies, methods, processes, models and languages (Buschmann et al, 1996; Rossi et al, 1997; Garzotto et al, 1999). In this sense, patterns are a pervasive, horizontal reuse strategy that can illustrate a recurring problem and its solution in a methodologically neutral manner.

Scenarios for elearning Implementation

Many universities face the challenge of reforming their teaching programs so that they become more compatible to the priorities and requirements of the knowledge society. Four scenarios regarding the use of

¹ The term design patterns originated in Architecture, when Christopher Alexander invented the idea of capturing design guidelines in the form of design patterns (Alexander et al., 1977).

information technology in tertiary education have emerged (figure 1) (Collis and Moonen, 2001, cited in Collis & Wende van der, 2002).

Figure 1: Four Scenarios for Educational Delivery

	Local and face-to-face transactions are highly valued	Global and network-mediated transactions are the norm
The institution offers a program and ensures its quality	Scenario A Quality control of a cohesive curriculum, experienced in the local setting. (Traditional Model)	Scenario B Quality control of a cohesive local curriculum, available globally. (International)
The learner chooses what he wants and thus takes more responsibility for quality assurance	Scenario C Individualization in the local institution (Innovative Programs)	Scenario D Individualization and Globalization (The New Economy)

Scenario A (traditional model) is still the current and dominant situation for many traditional post-secondary institutions.

Scenario B (International Expansion) results from the efforts of the universities to experiment with distance participation in the established programs, and therefore extend the number of their students locally and internationally. This scenario includes the possibility of transforming the traditional university so that it covers the needs of re-entry and mature students.

Scenario C (Innovative Programs) is characterized by efforts to develop interdisciplinary courses of study and to reinforce the traditional programs with new ones, which are closer to the labour market. The flexibility of this educational delivery allows students to structure their own program of studies, but, on the other hand, sets higher demands for the processes established for the guidance of students.

Scenario D (The New Economy) is the most radical one, since it results from interuniversity programs. The degrees are analyzed into modules and students have the flexibility to combine different options. Both teachers and students are distributed in several countries and institutions. Despite the fact that a systematic implementation of this scenario is not yet available in traditional Universities, it is increasingly being seen as the mode that will prevail in the future.

STUDENT AND TEACHER NEEDS SURVEY STUDY

Context.

The University of Cyprus is a public University that was established in 1989 and received its first students in 1992. It now includes five Schools (School of Letters, School of Economics and Business Administration, School of Humanities, School of Natural Sciences and the School of Engineering) and sixteen departments. It offers undergraduate and graduate programs (Masters and PhD). All departments are active in research and there are very strong links that facilitate close collaboration between the University and many parts of the Government of Cyprus.

The university's elearning strategy emphasizes the need to take advantage of networked technologies in order to improve the quality of learning and the effectiveness of the university's teaching program.

Purpose of study

The main purpose of the survey was to report on the views and experiences of the UCY students and faculty members regarding elearning implementation in university courses. Specifically, it aimed at:

(a) providing an initial evaluation of students' and faculty members' attitudes towards computer enhanced teaching, (b) reporting on their perceived requirements for implementing elearning in university courses, and (c) providing an initial input for a participative process of developing an institutional strategy for elearning

Sample

This research study took place at the UCY at the beginning of the spring semester of 2003. The sample of the survey consisted of:

1. 1938 students from four Faculties and thirteen departments of all years including undergraduate and post-graduate students, and
2. 46 members of staff, of all five Faculties².

Data collection was accomplished through a specially designed written questionnaire that was administered to the students during the registration week. The faculty members completed a slightly different version of this questionnaire during the first and second week of the semester. These survey instruments were organized in each case into three parts, which referred to the following three areas:

- Adequacy of skills concerning the use of information technology.
- The use of the UCY computer facilities and resources.
- The use of technology in the UCY courses.

Ten members of the faculty were interviewed for more in-depth analysis and for triangulation purposes.

Each interview lasted for about 70 minutes and all interviews were audio-taped. All interviews were unstructured and centered around the issue of the UCY policy for providing online support in parallel to its traditional implementation of teaching. After introductory remarks, the interviewer focused the discussion on five main issues:

- The perceived needs for any improvements in infrastructure
- Their experience in using computer based tools in teaching and learning
- Perceptions of the potential usefulness of such tools
- Their own interest in using elearning tools as supplementary resources in their teaching, and perceived obstacles
- The type of support that would be required for such a policy to be successful.

RESULTS

Adequacy of skills concerning the use of information technology.

An analysis of the student and teacher responses to the questionnaire indicated that most of the students (70%) consider themselves familiar with the use of computers while a considerable percentage of them (16%) consider themselves as beginners or totally ignorant of information technology. On the other hand, all faculty members consider themselves familiar with the use of computers.

Table 1 shows the percentage of the students and faculty who perceive themselves as knowledgeable of several types of software. It is important to state that both students and faculty report that they can adequately use word processing software, software for presentations (such as Microsoft PowerPoint) and software for electronic mail. Half of them consider themselves familiar with graphics software. However, only a small percentage of students and faculty feel that they can adequately use specific software categories such as programming languages, software for transferring files (such as FTP) and tools for discussion groups. It is worth mentioning that the only aspect of information technology skills that students consider themselves familiar with in a greater percentage compared to the faculty is the use of tools for

² At this time the Faculty of Engineering (established in the Fall semester of 2002) had not yet admitted any students

synchronous communication. Such programs have become popular with our students over the last two years.

Table 1 Teachers' and students' perception of their efficacy in using certain software.

	Teachers (%)	Students (%)
Word processing	100	85.4
Spreadsheets	60.9	32.9
Software for presentations (Microsoft PowerPoint)	76.1	65.8
Databases	58.7	21.1
Graphing Software (Microsoft Paint, Photoshop)	52.2	43.9
Statistical/mathematical programs (SPSS, Matlab)	52.2	19.2
Programming Languages	39.1	15.9
E-mail software programs (Microsoft Outlook)	95.7	63.8
Internet Browsers	91.3	44.8
Software for transferring files (FTP)	45.7	14.5
Discussion Groups	34.8	15.2
Tools for Synchronous Communication	30.4	48.4

In response to a question whether they would be interested in attending introductory programs concerning the use of Microsoft Word, Excel and Outlook, which are basic office tools, 33.8% of the students and 71.7% of the faculty answered negatively. This finding is somewhat discrepant from the results of Table 1 regarding the use of these tools. Despite the fact that 100%, 95.7% and 60.9% of the faculty perceive themselves as expert users of word processing, email software programs (Outlook), and spreadsheets (Excel), respectively, a significantly greater percentage than expected (29.3%) expressed an interest in attending introductory courses concerning the use of these software programs. This would either mean that more participants consider themselves as knowledgeable of this software than what is the case or that participants did not realize that the programs suggested were of an introductory type.

In response to a question whether they acquire satisfactory knowledge and computing skills through the university classes, 62.1% of the students answered in the affirmative. Regarding how comfortable students feel with the use of computers, out of the 37.7% of the students who stated that they are not satisfied with their skills, 25.5% are interested in attending supplementary programs concerning the development of basic skills, 24.7% would like to learn more about the possibilities of using information technology in their own discipline and only 12.2% are interested in further knowledge of Computer Science.

Data analysis indicated that students believe that their basic understanding concerning the tools of information technology can be significantly improved. At the same time, several societal circumstances have a positive impact on the development of students' basic computer and information literacy skills. Ongoing changes in the secondary education programs of study in favor of computer technology integration into the curriculum, and the fact that an increasing percentage of students nowadays have access to a personal computer and to the Internet at home, at the university or other settings, constitute examples of these factors. This suggests that students' basic computer and information literacy skills will eventually be improve over time due to other contributing factors, even if no systematic effort or teaching intervention on behalf of the UCY takes place. However, even though already willing, it is highly unlikely that students will be in a position to make effective use of elearning tools unless the University undertakes a concerted effort to promote the development of information technology skills for all and also implements a program of familiarizing students with online education.

The use of the UCY computer facilities and resources

Use of laboratories:

Table 2 indicates that the majority of students and teachers do not use the university laboratories. More specifically, 58.2% of the students and more than 90% of the teachers state that they visit the labs sparsely, seldom or never.

Table 2: Teachers' and students' responses to the question "How often do you visit the University computer laboratories?"

Frequency	Students (%)	Teachers (%)
On a daily basis	10	*
Few times a week	31.5	6.7
Sparsely	26.3	22.2
Seldom	31.9	26.7
Never	*	44.4

*This option was not available in the questionnaire for this group

Table 3 shows that the majority of students and teachers consider the university laboratories to be satisfactory as concerns the equipment, the software, the working hours and the technical support they provide.

Table 3: Teachers' and students' evaluation of the adequacy of the UCY information technology services.

	Inadequate		Satisfactory		Adequate	
	Students	Teachers	Students	Teachers	Students	Teachers
Equipment	17 %	7.4%	68.9%	51.9%	14%	40.7%
Software	10.4%	0%	74.2%	70.4%	15.4%	29.6%
Working hours	24.3%	29.2%	59.9%	50%	15.7%	20.8%
Technical support	16.4%	11.1%	69.2%	63%	14.4%	25.9%

Table 4 presents students' reasons for visiting the university laboratories. Most students (64.4%) visit the laboratories to complete course assignments and only a small percentage (8.3%) of them visit the laboratories for communication purposes. The statements of students on this point is somewhat at odds with the finding that nearly half of them are familiar with synchronous communication tools.

Table 4: Students' reasons for visiting the university laboratories

	Yes	No
To attend a course	39.4%	60.6%
Email	41.2%	58.7%
Internet browsing	48.5%	51.5%
To complete course assignments	64.4%	35.6%
To access databases and download files	23.7%	76.3%
To communicate with other people (discussion groups, synchronous communication)	8.3%	91.6%

Table 2 shows that most of the students and teachers do not frequently visit the university laboratories. In response to another question of the survey, 62.7% of the students stated that they access the internet from home and only 26.6% of them identified the university laboratories as their preferable place to access the internet. The latter may constitute a possible explanation for the infrequent use of the university laboratories by students. Another possible explanation is the fact that only a very small percentage (less than 20%) of students characterize the UCY information technology services as adequate. This may be an indication that students would most probably be in favor of the improvement of the laboratories in terms of the four factors examined in this survey (equipment, software, working hours, technical support).

Furthermore students' use of the computer laboratory facilities and resources does not seem to be a requirement of the courses they attend since only 39.4%, and 64.4% of the students state "course attendance" and "the completion of course assignments" as reasons for accessing the labs, respectively.

Around 80% of the students report that they prefer freely available webmail accounts and do not make use of the account provided to them by the UCY. One of the reasons may be an intelligible string of characters that the UCY imposes for its students log-in names. An important communication facility that is not yet provided to UCY students is remote access to the dial-up service of the university server. This may probably be a second reason justifying students' strong preference towards the use of free-service email accounts (e.g. Hotmail, Yahoo!mail) and consequently students' extremely limited use of the university email accounts.

Access of the UCY website:

During the fall semester 2002, 85% of the students visited the website of their department a few times a month at most (with a percentage of 13.6% of the students stating that they have never accessed the prementioned website). Moreover, only 30% of students believe that the UCY website provides information that can be considered as useful for their studies.

In regards to the faculty, 75.6% of teachers have accessed the university website a few times a month at the most (with a percentage of 22.2% of them stating that they have never accessed this website). Furthermore, approximately 30% of them see no value or usefulness in the website in terms of providing information that can enhance and support their teaching.

Informal data indicate that the most common use of the university website lies in the fact that it provides students with announcements regarding the courses and examinations schedule (once or twice during each semester) and information regarding other events organized within the departments. This results in the students' perception of the website as an announcement place rather than a place where real work is produced and indicates that there is a need to improve the website in order for it to have an impact on the teaching and learning process.

The use of technology in the UCY courses.

Table 4 provides information concerning the use of technology in the university courses.

Table 4: Students' and teachers' perception of technology implementation in the university courses

	Often (%)		Sometimes (%)		Seldom (%)		Never (%)	
	Teachers view	Students view	Teachers view	Students view	Teachers view	Students view	Teachers view	Students view
Specialized software for projects	47.7	29	29.5	35.9	13.6	16	9.1	18.2
Website supporting the course	31.8	14.5	6.8	29.7	4.5	19.5	56.8	36.2
Message board, mailing list, etc	9.1	7.9	9.1	19.6	11.4	16.2	70.5	56.2

It is important to mention that 47.7% of faculty claims that the use of specialized software for students' projects is a requirement of the courses they teach. On the other hand, a significant percentage of the faculty has seldom or never used a website complementing a course (61.3%) nor any communication tools (message board, mailing list) (81.9%). As expected, students' views are not in conflict with teachers' views on this matter.

These results imply that specialized software, which usually runs offline, is being implemented in the context of UCY courses at a much greater extent compared to websites and communication tools, the implementation of which requires an online environment. It seems that even the UCY courses that implement computer technology do not comply with the elearning paradigm. Therefore, since UCY graduates do not have the opportunity to acquire the foundation knowledge of technological innovations through their course of study, it is uncertain that they will be able to respond to the challenges of a technologically advanced society.

Ten members of the faculty were interviewed. Three of these teachers had reported that they use some software in their teaching with which students are expected to familiarize themselves. Five of the teachers reported that they have used powerpoint presentations in their teaching and the remaining five reported that they do not make any use of computers. All interviewees express strong concerns about who would undertake the development of online resources and stressed the need for the University to offer intensive support to faculty in this area. At the same time all interviewees recognized that the policy would only be successful if the faculty were on the one hand encouraged to participate (through specific support measures and through incentives) and at the same time if they felt free not to participate. This would imply that those who chose to participate would have a sense of ownership of the whole endeavour.

33% of the faculty argues against the potential usefulness of technology for their own teaching. Typical counterarguments supported by some teachers are that technology promotes a technocentric emphasis and it creates a distorted view of both science and learning due to emphasis on tools rather than ideas. As a consequence, students are thought likely to pay less attention to real learning. Others believe that the learning curve requirements far outweigh the potential benefits of the use of technology and some others strongly support that students need detailed guidance, and not interaction. Two of the interviewees mentioned that they believed that the university should concentrate its efforts on improving the quality of its student's intake in their respective disciplines. The implication was that no amount of investment in reforming teaching practices could influence the learning outcomes in any way unless this issue was addressed first. One teacher declared explicitly that: "all these would be a waste of time and effort because the students were neither capable nor motivated enough".

On the other hand, 46,5% of the faculty expressed an interest in participating in a pilot elearning exercise. Out of them, 80% anticipate improved student engagement and motivation, 85% expect increased interaction among students, 30% expect improvement in the quality of their courses, and 25% have an interest in developing distance learning modules as a means of saving on teaching time. It is interesting to know the contrast between the high percentage of teachers who anticipate improved student engagement and the much lower percentage of them who anticipate any improvement in the quality of the learning outcomes.

DISCUSSION

Possible scenarios regarding the use of new technologies in the UCY courses of study

The university faces the challenge of taking advantage of continuing technological innovations to establish the viability and improve the quality of its degree programs. The results of this survey indicate that currently the technological competency of the UCY graduates may not be considered adequate for the needs of the knowledge society. On the other hand, the results also demonstrate that student information technology competencies have been improving and that, on the whole, both faculty and students recognize positive potential in networked technologies. As a result in order for the UCY to be able to function in a flexible way locally and globally, the establishment of a framework which will promote the development and continuous assessment of the curriculum is considered necessary.

We believe that the possible future scenarios for the UCY could be the following:

- Scenario 1

The first scenario refers to the lack of a coherent, institutional policy, and the implementation of fragmented attempts to develop web-based learning environments. This scenario also provides for experimentation with distance participation in the university's established programs of study. In this scenario the University has not taken proactive measures and, hence, no technical and administrative support is provided; as a result, the members of the faculty will have to spend excessive time and make extreme efforts to implement elearning in the courses they teach, and therefore widespread disillusionment may be expected to evolve.

- Scenario 2

The second scenario refers to the complementary support of the traditional teaching procedures with elearning resources. The latter can be accomplished through the provision of a suitable platform for elearning (which may be bought or developed from scratch) and through necessary support measures for interested faculty; types of administrative support that could be usefully offered include digitization of the curriculum through a newly founded Instructional Support Resource. The explicit aim of this scenario is to attain quality improvement in teaching and learning. It is therefore important that all participants share in that purpose and take specific action to monitor progress in that direction.

- Scenario 3

The third scenario incorporates a distance learning strategy as a means of expansion and interuniversity collaboration. This scenario relies on the development of new technology-enhanced programs of study or modules within existing programs. Distance learning degrees, programs for professional development, in-service training and mechanisms to attract foreign students could constitute a part of the long-term goals of the university.

Potential Impediments to the implementation of the scenarios

When implementing one of the above scenarios, the university should foresee and be able to confront any of the following potential impediments:

- The above mentioned changes may take place at a much slower pace compared to the duration of the corresponding changes at other universities. In this case, the UCY would simply be implementing an already outdated system.
- New technologies may have an influence only at the level of simple use of basic tools (word processing applications, electronic mail) and not at the level of the processes of teaching or the quality of learning. A possible distinct danger is the possibility of any kind of change to be led by new technologies rather than by the need to improve learning.
- Appropriate motivation or technical and administrative support may not be provided to the faculty, who are called to undertake additional initiative and excessive course load.

Recommendations

Emphasis should be given to a careful development of an eLearning strategy so that the latter is optional for faculty while at the same time open and inclusive. It is also crucial that appropriate and extensive support measures are put in place for faculty interested in undergoing the transition. Moreover, support should be provided at four different levels: students, software platform, courses and administration. More specifically, efficient access for the students, continuous technical support on the use of the eLearning platform, technical support by graphic artists and software engineers for the development of online objects (animations, simulations), and, administrative support for the continuous updating of online content are necessary. There is also a need for a succinct declaration of the aim and value of elearning to the university community in order for a common vision to gradually develop and for detailed evaluation and feedback procedures to allow for continuous qualitative improvement.

Finally, institutional policy is an important prerequisite for elearning to realize its potential benefit. Institutions need to seek a balance between externally provided tools and internally grown expertise and mission awareness. Explicit declaration of the institutional mission and how the objectives of the elearning strategy fit into this mission open the way for developing a range of instruments and action for monitoring progress towards meeting those objectives. For example, careful evaluation and formative refinements are crucial instruments in the process of continuously evolving elearning paradigms as contexts for improved teaching and learning

CONCLUSION

Like other universities, the University of Cyprus is facing the challenge to take advantage of continuing technological innovation to further develop its teaching programs. The success or otherwise of this endeavor will depend largely on three factors:

- a) the extent to which the UCY will adopt a simple strategy with an explicit purpose to either improve the quality of the learning outcomes or to expand into distance learning programs or a combination of both.
- b) The extent to which the faculty will adopt this strategy and develop ownership of the various measures in the context of their teaching responsibilities.
- c) The extent to which the university will offer adequate support at the levels of software platform administration, on-line resource development and impact monitoring.

REFERENCES

Alexander, C., Ishikawa, S., Silverstein, M., Jacobson, M., Fiksdahl-King, I. and Angel, S. (1977). *A Pattern Language*. Oxford University Press, New York.

Avgeriou, P., Papasalouros, A., Retalis, S. and Skordalakis, M. (2003). "Towards a Pattern Language for Learning Management Systems." *IEEE Educational Technology and Society* 6(2), pp. 11-24.

Buschmann F., Meunier, R., Rohnert, H., Sommertland P. and Stal, M. (1996). *Pattern-Oriented Software Architecture, Volume 1: A System of Patterns*. John Wiley & Sons.

Collis, B., & Wende, M. van der (Eds.) (2002). *Models of technology and change in higher education: An international comparative survey on the current and future use of ICT in higher education*. Enschede: CHEPS. (145 pp.)

Eriksson, H. and Penker, M. (2000). *Business Modelling with UML, Business Patterns at work*, John Wiley & Sons.

European Union (2003) Report: Elearning: The Way to Reach the Lisbon Goals. Available at: http://www.media-res-koeln.de/Events/LEANRTEC_Event/Hieronymi_en.pdf

Fowler, M. (1996). *Analysis Patterns: Reusable Object Models*, Addison-Wesley.

Gamma, E., Helm, R., Johnson, R. and Vlissides, J. (1994). *Design Patterns: Elements of Reusable Object-Oriented Software*, Addison-Wesley.

Garzotto, F., Paolini, P., Bolchini, D. and Valenti, S. (1999). Modeling-by-Patterns of Web Applications", In Proc. *International Workshop on the World Wide Web and Conceptual Modeling*, WWW CM'99, Paris, November 1999.

Griffiths, R. and Pemberton, L. (2003) *Don't Write Guidelines, Write Patterns* <http://www.it.bton.ac.uk/staff/lp22/guidelinesdraft.html>: last accessed on 29 September 2003.

IBM Patterns for eBusiness: [<http://www.ibm.com/framework/patterns>]

Means, B., & Olson, K. (1994). The Link Between Technology and Authentic Learning, Educational Leadership, 51 (7), 15-18

Meszaros, G., and Doble, J. (1996) *Metapatterns: A pattern language for pattern writing*. The 3rd Pattern Languages of Programming conference, Monticello, Illinois, September 1996.

Mullis, I.V.S., Martin, M.O., Beaton, A.E., Gonzalez, E.J., Kelly, D.L. & Smith, T.A. (1997). *Mathematics achievement in the primary school years*. Boston College, Massachusetts: IEA.

Mullis, I.V.S., Martin, M.O., Gonzalez, E.J., & Kennedy, A.M. (2003). *PIRLS 2001 International Report: IEA's Study of Reading Literacy Achievement in Primary Schools*, Chestnut Hill, MA: Boston College.

Nichols, M. (2003). "A theory for eLearning. IEEE Educational Technology and Society 6(2), pp 1-10

Rossi, G., Garrido, A. and Carvalho, S. (1996). Design Pattern for Object-Oriented Hypermedia Applications". In Vlissides, J., Coplien, J., Kerth, N. (Eds.) *Pattern Languages of Program Design, Vol. 2*, chapter 11, pp. 177-191., Addison-Wesley, 1996.

Rossi, G., Schwabe, D., and Garrido, A. (1997). Design Reuse in Hypermedia Application Development. In Proc. of *Hypertext'97*, Southampton, UK.

Schmidt, D., Stal, M., Rohnert, H., and Buschmann, F. (2000). *Pattern-Oriented Software Architecture, Volume 2: Patterns for Concurrent and Networked Objects*. John Wiley & Sons.

Thomson, P. (2000). "The Sorcery of Apprenticeships and New/Old Brooms: thinking about theory, practice, "the practicum" and change." Teaching Education 11(1).

The E-LEN Website: [<http://www.tisip.no/E-LEN/>].

Ravenscroft, A. (2001). Designing E-learning Interactions in the 21st Century: revisiting and rethinking the role of theory. *European Journal of Education*, 36 (2), 133-156.