Information Technology and eLearning: Towards a Digital World

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Abstract: - Information technology has an increasingly important role in education. More and more information is in digital format, and it is accessible through networks. Existing technology allows learning to take place anytime and anywhere. Overall, education may take advantage of possibilities that technology makes possible. The prerequisite is that learners and educators have skills and knowledge in using information technology so that they can manage in the increasingly digital world.

Key-Words: - information technology, modern learning environment, eLearning

1   Introduction

Information technology has an increasingly important part in our lives. This is also the case in education. Information technology can be used in education in a number of ways ranging from information delivery to acting as cognitive tools in the learning process [1]. In general, the role of information technology in education is to support the learning process in the best possible way [2], [3], [4], [5].

In education the key issue in learning is interaction between teachers, students and fellow students - and this interaction should be powered with information technology. Therefore, also in modern learning environments the sophistication of technology is not the issue. The way we understand this those involved in education and learning should have understanding and knowledge in using information technology, otherwise the value of technology is questionable.

2   eLearning environments

Pedagogically learning is considered as an active, constructive process [6]. The learner is expected to take action, use different tools and technologies in gathering and processing data into meaningful information. However, technology should not have a central role, instead it should support the learning process [7].

In this chapter we look at the impact of information technology on learning, and the skills that learners and teachers should have in order to manage in the increasingly digital learning environment.

2.1   Changes in learning environments

In the 21st century it has been widely acknowledged that learning can happen also in other places than traditional classroom. Information technology has been one of the elements that have affected the way we today understand studying, schools and learning. Where "classical" education is bound to classrooms, eLearning allows studying at any time without geographical limitations. Many learning environments use information technology, are developed with WWW-technology and can be accessed using a browser.

The term eLearning can be understood differently because the way in which technology is used varies greatly. There may be on-line courses and education where practically all learning material, tutoring etc. is based on computers, networking and digital information. The learner may not have any "real" contact with the teacher of the course. However, in most cases courses are only partly digital with some lecturing, tutoring, group work or other more traditional methods. This is called "mixed mode" education. Whereas fully digital on-line courses can be too extreme because of lacking human interaction can mixed mode education combine the best elements from information technology and education that is based on human interaction.

Changes in the learning environment affect also the roles of students and teachers. Teachers task change from traditional lecturing towards tutoring, orientation, motivation and facilitation along the learning process. On the other hand, in a learning environment where there is less face-to-face contact with teachers students need to be more active in searching for information and processing it using different technical tools. The goal in modern learning environments is to engage students in active knowledge construction and reflective thinking [5]. Thereby, the pedagogical goals in traditional and modern learning environments have not changed, but the range of pedagogical learning tools is different.

2.2   The need for new skills

Technology is a challenge for teachers and students. Teachers should be skilled computer users, as they have to use different devices and applications in preparing material into digital format. It involves more than converting material into files, because one must also understand the limitations of existing technologies. In eLearning these limitations include low networking bandwidth and relatively low computer performance, which make use of live video and audio problematic (and practically impossible). Information is to be delivered through a screen, which narrows the communications possibilities further. From teacher's perspective eLearning involves lot of work in different stages of the learning or teaching process, from planning and preparing the material to tutoring, giving advice, feedback and evaluation. In this process also teachers need support, motivation and guidance.

The students are expected to manage the learning environment, which is becoming more and more technical. Tutoring and hands-on advice are needed so that the student learns to use technology in studying. In a traditional classroom and school environment can support needs be addressed by other students, teachers or support staff [8]. However, in eLearning are these more challenging to arrange. For example, when the student is studying at home by a computer are advice and tutoring limited by the tools that the student is using, and these are often the ones that the student is having problems with. The student may search for answers in support forums, send questions by email, call for advice, but real hands-on advice may not be available. Technology may be unreliable, and therefore the learner must find ways to overcome problems, which may take place in the evening or during weekends. The student needs to deal with technical difficulties in an increasingly technological environment - the learning itself can easily become a secondary issue here.

Storage, categorizing, access and processing of information rely heavily on information technology. In eLearning most of the data and learning material is in digital format so that it can be accessed anywhere and anytime. Also discussion and feedback between teachers and students takes advantage of telecommunications. Because information technology and networks have a central role in the learning process, IT-related skills have become increasingly important. One should be familiar with using technology; otherwise it may become overwhelming to manage the environment. It could be expected than when technology is involved in learning the goal should be that the learning experience would be better than with "classical" methods.

3   Adaptation in eLearning

Ideally, technology should be applied or adapted so that it supports the learning process in the best possible way. As technology can sometimes work unreliably and be difficult to use is adaptation an important issue in modern learning environments [9]. In learning environments adaptation falls into two main categories [10]: adaptation to the client device and adaptation to user's behavior.

Adaptation to client device is about portability, the ability to use different infrastructures, operating systems and hardware devices. The same learning material should be accessible with desktop computer and portable terminal, even though the screen sizes and input devices would be different. The designers of eLearning environments need to bear in mind that heterogeneous environment do not allow use of bandwidth-intensive data in the learning material. One possibility is to let the user (learner) decide what content to load. In this case the environment should have high-bandwidth/low-bandwidth -options. In addition, the design of the user interface is an important issue. In many cases the eLearning environment is built so that it interfaces with internet, or is accessible with a browser. The flexibility and adaptability to different user terminals is further increased by using the XML-standard in preparing the material [11].

The second type of adaptation, adaptation to user's behavior refers to user's expectations and experiences on interface, ease of use, how content can be navigated etc. The learning environment

should adapt to different learners and learning styles, not vice versa. In theory, information technology enables customization and makes it possible incorporate different learning styles [12], [13]. Clearly, each user experiences the learning environment differently, and this makes designing adaptation to user's behavior a difficult task. The challenge is usually approached by gathering and analyzing information on different users so that the environment could be customized to different kinds of users. In real life the adaptation is typically done by giving the user choices so that the user can do some modifications in the environment [14].

The successfulness of adaptation to user's behavior varies as often one learner will find the environment too simple, and simultaneously other considers it complex, gets lost and confused. The customization-related features and navigational solutions depend on the developers of the environment: systems designers and programmers who understand needs of the users are a valuable resource. In addition, development of a successful learning environment depends on teaching staff. Often the pedagogical aspects remain unchanged, and transforming course material into the web is considered as the most important issue in creating an eLearning environment. Instead, guidelines and tutoring on how to use the technical resources and electronic communication are needed as they help in managing the digital environment.

4   Towards successful learning

There is a demand for eLearning environments. This is a natural extension to the fact that in most households are equipped with computers. In some families there are several computers, desktops and laptops, and mobile devices that can be used to access to Internet. In this light it is not surprising that students of all ages want to use computers and information technology in learning. Technology has become so natural part of life that it seems natural to expect that technology is incorporated into the educational system and learning as well. Consequently, the pressure to apply information technology in a way that it supports the learning process is significant.

One of the cornerstones of learning in eLearning-environments is confidence. The technical platform and application base should be robust and reliable. Network connections are critical, as access to material and communications rely on networks. The whole environment must function smoothly without interruptions; otherwise the confidence in eLearning is rapidly lost. Another aspect to confidence is that user authentication must be so solid that it is not possible to cheat or capture someone's identity. As it is impossible to know who actually sits behind the terminal it is good not to trust blindly everything that a person claims in a discussion forum, for example. Also in eLearning the curriculum consists of orientation, reading material, exercises, group work assignments, motivation and evaluation are the ingredients of a typical learning process – this can hardly be cheated even in a digital environment. Consequently, technology does and should not have a leading role learning, at the end of the day it is each learner's desire to learn that makes a successful learning experience.

Students need guidance and support in their studies. In addition to normal study orientation and "knowing what to study" the students of the digital age need to be skilled computer users and able to manage in the eLearning environment in order to study. This is an important issue especially with adult students who may not all be experienced computer users. Without support some students may be lost, and the focus shifts from learning to dealing with computer-related problems. Special attention is needed in teaching students to use technology so that they learn to study in eLearning environment.

Motivation is the driving force in learning. Feedback has an important role in increasing of motivation and confidence, and it is considered critical for the learning process in digital learning environments [15]. Personal, immediate feedback is often the best way to motivate and orientate the learner. In eLearning environments can information technology give instant and individualized feedback to students, or technology can be used in communications. The eLearning environment makes it also possible to monitor the students' progress and to identify different styles of information access, communication and learning [16]. In a computer-based environment the richness of face-to-face discussion may not be achieved, instead technology can bring added value by enabling faster communications and feedback to the student. The student does not have to wait reception hours – even though personal contact with a teacher is still important part of student orientation and motivation.

In the long run success of eLearning depends on motivational issues: motivation and dedication to develop the environment together with user acceptance are critical success factors. In other words, the success depends on human element rather than technological sophistication.

5   Discussion

Information technology and networking have an increasingly important role in education. Students and teachers meet in a learning environment, which often is a virtual learning place instead of a classroom. Also the access to information takes place through computers. It can therefore be argued that skills and knowledge in using computers, networks and related technologies are essential in the digital age.

Today ever smaller and powerful portable devices and technologies make it possible access information and keep in touch anytime and anywhere. At the same time the need for supporting the students and teaching staff. Technology and networking makes the learning environment complex: even though the environment itself would be straightforward to navigate the devices and technologies used in connecting to it may not be that. It is not uncommon that access to information requires dealing with computer settings, protocols and passwords, and the overall uncertainty that is part of technology. Learning to use new technologies and "learning to learn" in an environment with less face-to-face contact calls for independent, and active learning skills and reflective thinking [5]. Thereby, development of support for students and teachers is needed in order to increase the confidence in the eLearning environment. Teacher's role in eLearning changes from lecturer to tutoring. At the same time teachers need to find the optimal mix of traditional pedagogical methods and new information technology in eLearning so that the learning experience is as successful as possible.

The learning environment should also be as flexible and adaptable as possible so that different technologies and devices can be used in accessing and processing information. Another important issue is adaptation to users with different skills, knowledge and learning styles [17]. This is a challenge as eLearning opens doors for new potential groups of learners. The successfulness of eLearning depends on several issues and is also a matter of opinion. Ultimately, motivation in developing and using the learning environment is a critical success factor, and not the sophistication of technology.

References:

[1]   Reeves, T.C. - Laffey, J. Design, Assessment, and Evaluation of a Problem-based Learning Environment in Undergraduate Engineering. *Higher Education Research & Development,18*(2), 1999, pp. 219-232.

[2]   Vivet, M. The classroom as one learning environment of the future. *Journal of Universal Computer Science*, 2, 1996.

[3]   Sumner, T. - Taylor, J. Media integration through meta-learning environments. In Eisenstadt, M., & Vincent, T. *The Knowledge Web: Learning and Collaborating on the Net.* Kogan Page, London, 1998.

[4]   Scott, P. - Phillips, M. Developing Web-based student support systems: telling student stories on the Internet. In Eisenstadt, M., & Vincent, T. *The Knowledge Web: Learning and Collaborating on the Net.* Kogan Page, London, 1998.

[5]   Jonassen, D.H. *Computers as Mindtools for Schools: Engaging Critical Thinking.* Upper Saddle River, NJ: Merrill/Prentice Hall, 2000.

[6]   Lave, J. - Wenger, E. *Situated learning: Legitimate peripheral participation.* Cambridge: Cambridge University Press, 1991.

[7]   Gros, B. Knowledge Construction and Technology. *Journal of Educational Multimedia and Hypermedia*, 11(4), 2002, pp. 323-343.

[8]   Taylor, J. - Sumner, T. - Law, A. Talking about Multimedia: A Layered Design Framework. *The Journal of Educational Media,* 23(2-3), 1997, pp. 215-141.

[9]   Raskin, J. *The Human Interface, New Directions for Designing Interactive Systems.* Addison-Wesley Longman Inc, Massachusetts, 2000.

[10] Brusilovsky, P. Adaptive Hypermedia. *User Modeling and User-Adapted Interaction,* 11, 2001, pp. 87-110.

[11] Wehner, F. - Lorz, A. Developing Modular and Adaptable Courseware Using TeachML. *Proceedings of ED-MEDIA 2001*, pp. 2013-2018.

[12] Albright, M. (1999). "Teaching in the Information Age: A New Look." In Theall, M. (Ed.) *New Directions for Teaching and Learning.* San Francisco: Jossey-Bass Publications, pp. 91-98.

[13] Wild, M. - Quinn, C. Implications of educational theory for the design of instructional multimedia. *British Journal of Educational Technology,* 29(1), 1998, pp. 73-82.

[14] Rich, E. User Modeling via Stereotypes. In Maybury, M.T., & Wahlster, W. (Ed.) *Readings in Intelligent User Interfaces.* Morgan Kaufmann Publishers Inc, San Francisco, California, 1998.

[15] Rowntree, D. *Exploring Open and Distance Learning.* Kogan Page, London, 1992.

[16] Hummel, K.A. - Hlavacs, H. Anytime, Anywhere Learning Behavior Using a Web-Based Platform for a University Lecture. SSGRR 2003, 7th – 12th of January, l'Aquila.

[17] Raskin, J. The Human Interface, New Directions for Designing Interactive Systems. Addison-Wesley Longman Inc, Massachusetts, 2000.