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ADVANTAGES AND DISADVANTAGES IN e- LEARNING PROCESS

Abstract

Before starting to attempt this paper, it is necessary to define what the field actually comprises. In such a diverse field as e-learning there obviously exist different views on the topic and therefore different definitions. e-learning is learning facilitated and supported through the use of information and communications technology. e-learning can cover a spectrum of activities from computer supported learning to blended learning (the combination of traditional and e-learning practices), to learning that is entirely online. Whatever the technology, however, learning and teaching are the vital elements

Key Words: activities, books, computer, education, e-learning, learner, teacher

Introduction

The development of e-learning based on the definition started in 1588 with one of the first applications, Agostino Ramelli's "Book Wheel".

This "Book Wheel" allowed the user to access several books at the same time without having to close and store them. The books were attached and secured to a wheel that could be rotated by the reader. This could be seen as a first example of allowing a user to navigate between different contents of learning material.

In 1945, Vannevar Bush introduced a theoretical device called the Memex for Memory Extender. The Memex was described by Bush as a device that allowed the user to create links between different media types (books, films), to navigate between them and therefore to extend his or her memory.

In 1989, Tim Berners-Lee extended the idea even further and created the World Wide Web (WWW), which is a wide-area hypermedia information retrieval initiative that aims at giving universal access to a large universe of documents. This idea finally resulted in the now existing World Wide Web which forms the technical basis for e-learning in most of the ongoing projects in this area.

e-learning projects have always been existing throughout the years, but have gained a lot of importance especially from the 1990s until today. In 1994 Bob Jensen and Petra Sandlin identified the leading hypermedia and hypertext systems in higher education and described them in detail. This study is a good indicator that especially in the area of educational hypermedia several major projects were going on at that time. Furthermore, several research groups were formed and are still working in the field of e-learning.

Additionally, the research on the pedagogical side of e-learning is constantly going on. The goal of all these projects is to improve the situation of both learners and teachers in e-learning.

FORMS OF e-LEARNING

Computer Based Training

Computer Based Training (CBT) is a term that specifies learning software which can be used

by the learner with a high temporal and spatial flexibility, i.e. the student can learn wherever and whenever he wants. The learners or students are not in contact with other learners, teachers or tutors. CBT programs can contain multimedia content, for example animations or videos, and are usually distributed via CD-ROM or DVD.

Furthermore, CBT usually focuses on an auto-didactic way of learning, i.e. the student is in control of what and how to learn. Communication between learners, tutors and teachers takes place asynchronously, if at all.

Wagner and Flannery state that CBT practitioners should pay attention to organisational, cultural and individual characteristics with regard to the aspects of self-determination and self-management as central components in order to understand the adult user's acceptance of computer based training.

Web Based Training

Bransford et al. point out that Web Based Training (WBT) is a further development of CBT and is based on the World Wide Web and its functionality. Therefore, the different learning contents are not stored locally on a data storage device, but provided dynamically via the Internet from a web server. Additionally, the usage of the World Wide Web allows the usage of communication tools like e-mail, news, chats and discussion forums. Furthermore, all collaborative approaches are WBTs because of their usage of those communication tools.

Scheines et al. compare a traditional lecture format with an online format in order to determine whether online courseware can replace large lectures without decreasing learning outcomes.

The analysis of learning outcomes indicates that the online courses are as effective or significantly more effective than large lecture courses, which supports the claim that online courses can replace large lecture courses. In addition, a regression analysis shows that recitation attendance most strongly predicted final exam performance (2% more per attendance). This means that regular face-to-face meetings in person are critical to the learning process even in online settings.

Furthermore, Mioduser et al. point out that the situation regarding web based learning environments could be summarised as one step ahead for technology, two steps back for pedagogy. For example, most sites elicited cognitive processes such as information retrieval (52%) or memorising (42%), whereas only 32% required analysis and inference; higher cognitive processes such as problem solving (5%) were rarely required. Interaction types were more or less restricted to browsing (76%) and multiple choice (31%); complex (3%) or online (6%) activities were rare. Collaborative learning was only manifest in 3% of the sites. The most common form of communication was e-mail (65%); more advanced tools for collaboration were hardly used at all.

Cheaney and Ingebritsen point out the aspects of problem based learning and Sung et al. analyse the design and application of web based self and peer-assessment systems. Both of them claim that the students' learning success was growing when they used e-learning in a WBT environment.

Hypermedia Authoring Tools (HATs)

Hypermedia Authoring Tools (HATs) are development tools for the creation of hypermedia learning content. Elliott defines their purpose as the creation and modification of hypermedia learning content, for example the support of teachers during the creation process of educational material. There are fairly easy to use authoring systems, so that the authors of the educational content do not need a lot of technical expertise. However, these easy to use systems aim at the creation of single-focused material, for example the creation of material that will not be reused later on.

More sophisticated authoring systems aim at the reuse of material, but are not very easy to use for the author.

A rough classification of HATs is:

Authoring systems for media types, for example HTML sites, graphics, animations, etc.

HATs for the creation of educational material

HATs for the presentation of educational material

Some HATs aim at integrating all the described functions, allowing the easy creation of educational material including different media types and the professional delivery of the material. The media types text, images, video and audio files are usually supported.

Dedicated HATs are systems that are specialised in specific learning environments, but are only creating material for those environments.

The navigation through the educational material is sometimes controllable by programming or scripting languages.

Generally, the easier to use a HAT is, the more limited is the flexibility of the created learning material. HATs that are very flexible are often difficult to use and much more complex.

Simulations

Simulations aim at recreating or simulating real models and their relevant attributes. Learners or students are then allowed to do free or guided experiments within the simulation. The students can observe the results and can learn by transferring the knowledge gained by the simulation to the original situation. For example, Thissen describes and analyses the simulation for the training of members of management.

Whitehouse explores the question whether web-enabled simulations provide new ways of learning and describes the development process and marketing strategy of web-enabled simulations. The Learning Lab has developed 18 web-enabled simulations, real-time learning experiences and interactive programs that challenge students to think strategically across multiple business functions.

De Jong et al. and Dumblekar show that the application of simulations supports the creation of beneficial e-learning scenarios.

As a further example of simulations and extended simulations, real laboratories can be named that exist already and can be accessed and used online.

Video conferencing / Teleteaching

The technology of video conferencing allows the creation of virtual classrooms, where the spatial border between teacher and student can be crossed and communication is possible. This variant of e-learning is sometimes also addressed as teleteaching. Its main characteristic is the transfer of audio and video which allows a communication between the teacher and the students very similar to a traditional classroom situation.

However, the relatively high requirements to the technical equipment limits the usage of teleteaching. The growing bandwidth of Internet connections will probably allow new technologies, e.g. video and online teaching via the WWW.

Chua et al. present for example a tool called Conversant Media for the use of synchronous and asynchronous discussion of videos and report preliminary results of an evaluative comparison of using this tool versus using an off-the-shelf threaded discussion tool. The tool allows participants to engage in discussions of video footage by attaching comments to video frames. A timeline shows the frames to which comments were attached. The tool presented is interesting because it is quite novel. Also, it shows that there are many instances where off-the-shelf tools are too restrictive and do not meet the pedagogical requirements. As there is an increasing educational use of computer-mediated communication, it would be interesting to see more tools which explicitly satisfy a particular educational need.

Adams et al. present an interesting project about the usage of a telepointer for e-learning. A telepointer essentially is a mouse that gives the presenter the opportunity to focus on a particular spot on a remote computer. While investigating the optimal technical details of telepointers, the researchers designed their work to fill a gap in experimental knowledge about performance and satisfaction derived from using this tool. The most impressive finding is the great advantage that the telepointer groups had in retaining their knowledge from both the online and local experiment after a five week period in the first experiment, despite the fact that they had spent less time on task. The telepointer group was also faster at grasping the answers to the questions the expert was asking and did not require clarifying questions to understand his point.

Additionally, it has to be remarked that the distribution of documents, e.g. presentations, is another important issue in the area of teleteaching or video conferencing. For example Adobe connect provided the technical platform for a teleteaching situation in the academic year 2008 at the University of Applied Sciences in Regensburg.

Learning Management Systems

A system that supports and manages online or offline educational material is called a Learning Management System (LMS). The support of the LMS can include the complete workflow of the administration of learning and teaching processes including the administration of resources or only parts of it.

An LMS can fulfil the following tasks:

Planning: covers the planning and construction of (online) learning material, the creation of individualised learning plans and the creation of learning profiles for learning groups

Registration: covers the online registration to all the offered learning courses, often with interfaces to an e-commerce system where the material can be purchased

Allocation of course material: covers the administration and storage of learning materials in different formats for the different learning approaches, for example WBT and standard classroom situation

Measurement and administration of the students' learning successes

Some LMSs also include teacher and room management to administer the re-sources and resolve possible conflicts, e.g. time-tabling of teachers and rooms is supported.

Additionally, the existing data can be analysed and used for the creation of reports, for example room occupancies, time tables or learning improvement of individuals.

Martins and Kellermann's findings indicate that the students are strongly influenced by perceived performance consequences and by social influences from their instructors and their peers in assessing the usefulness of a new LMS. Students were more likely to perceive the system to be easy to use if they believed that there was adequate technical support

available when they needed help with the system, and if they had greater prior experience in using computers and the Web.

Learning Content Management Systems

The tasks of a Learning Content Management System (LCMS) are the creation, the reuse, the search and the delivery of learning materials. The content is often administered as learning objects in a centralised content repository. The learning objects can be referenced from different educational courses. Therefore, if a learning object is changed, it only needs to be changed in the central repository and the changes are known immediately in all the learning courses.

The LCMS usually has a user management (in contrast to the HATs) that allows to distinguish between different users and user groups and to assign them different roles and rights to realise different kinds of access to the learning content.

Furthermore, this multi-user functionality allows to administer concurrent user access to the same learning object and to avoid unwanted changes of the learning object. Additionally, LCMSs usually implement a versioning control of the changes to a learning object.

One of the most important tasks of an LCMS is to allow the reuse of learning objects. The goal is to avoid unwanted redundancies and contradictory information about the learning objects.

Game based learning

A digital learning game is a game that tries to transfer knowledge by applying hard- and software to the player. The aspects of traditional learning games, e-learning and entertainment focused games are mixed to achieve the desired effects.

Digital game based learning mainly differs from traditional learning games and not game based e-learning in the following respects: the digital learning games are designed like modern computer games and use a completely different methodology of the knowledge transfer, but they still focus primarily on that knowledge transfer and not on entertainment.

Furthermore, the story line and the parasocial relation between the player/learner and the NPCs (Non Personal Characters) are used to achieve the wanted learning activity in the fictional gaming world.

Based on the many attributes that distinguish individual learning from group based learning, game based learning can be divided into:

digital learning games that are focused on the individual learner digital learning games that are focused on learning groups

Gee does not offer any solutions, recipes or recommendations for e-learning professionals, neither does he pretend to do so. His work is rather designed to provoke thoughts and reflections of use for those planning, designing or delivering e-learning simply by creating important references to how game designers manage to get players into learning mode not only voluntarily but continuously.

Pensky supports a very positive attitude towards the potential of game based learning. He substantiates his assessments with pedagogical, business and pragmatic arguments in a plausible way.

Blended learning

Reinmann et al. define blended learning as the mixture of standard teaching and learning approaches with the approaches of e-learning.

Denise's work presents a possibility of adapting theoretical principles and lessons learned from self-directed learning to a blended learning system for adults. The seven pillars she refers to are as follows: a project-oriented pedagogy, a mechanism for introduction and pre-training, new roles for trainers, an open training resources environment and a triple level of follow-up approaches.

It can be summarised that the experiences and results of the study show that there is an importance of offering a flexible curriculum that matches the learner's needs and a necessity to provide pre-training to learners entering blended programs.

Web based collaboration

Web based collaboration focuses on the collaboration on a specific learning task of a student

group via the Internet. Ng'ambi and Hardmann built and evaluated a knowledge-sharing scaffolding environment based on learners' questions as an example for web based collaboration.

Microworlds

A microworld is a tiny world inside which a student can explore alternatives, test hypotheses, and discover facts that are true about that world. It differs from a simulation in that the student is encouraged to think about it as a "real" world, and not simply as a simulation of another world (for example, the one in which we physically move about).

For example, White introduces several microworlds [49]. For every microworld four phases were identified:

1. Motivation phase
2. Model evaluation phase
3. Formalisation phase
4. Transfer phase

One of the most notable results is that on a set of classic force and motion problems, sixth graders taught by following the suggested curriculum significantly outperformed high school students taught by using a traditional, text book based curriculum. With regards to e-learning, it should be noted that it cannot be determined how much of this effect is due to the curriculum approach itself (i. e. focus on qualitative understanding, collaborative learning) and how much of the effect is afforded by the use of computers (i. e. use of interactive microworlds).

Visualisations

Barwise and Etchemendy show that visualisations of processes within modularised content can be used for e-learning, for example the Web Dance project. Within the visualisation of the process the single steps of the process will be presented to the learner with the help of audio and video. This presentation can lead to learning and to new knowledge of the student.

Donath discusses three research projects whose main interest lies on visualising online social

interactions. However, the focus does not lie on the context of learning, but on the online interactions by learners. The visualisations focus on providing the viewer with a qualitative sense of what is going on in a virtual discussion setting, synchronous or asynchronous.

Learning communities and social learning

Learning communities are formed of groups of learners that have the same learning goals or interests. They can build a commonly shared knowledge base via the learning community online and offline. Every member of the community can share his knowledge with the community.

Therefore, the knowledge base of the community is constantly extended and adjusted.

Furthermore, computer supported collaborative learning is an important form of e-learning, particularly in open and distance learning. McAlister et al. introduce an especially interesting type of collaborative activity, educational synchronous on-line dialogue between peers, which structures messages by time and topic thread, as is typically done in discussion forums. To help learners to argue, it also requires students to choose sentence openers from a pre-defined list for each message.

The tool Academic Talk shows that interface design, with a sound underlying educational design, can result in clear educational benefits. From an interface perspective, the tool is a small enhancement of standard chat tools, yet the impact on the dialogue is significant. As there is an increasing educational use of computer mediated communication, it would be interesting to see more tools that explicitly support online dialogue.

Dalsgaard argues that although universities across the world have implemented LMSs by now, it is necessary to move beyond LMSs in order to effectively use the Internet as a teaching tool, especially within the framework of social constructivist pedagogy.

Firstly, the concept of social software is defined with regard to the educational setting. It comprises networked applications which encourage people to learn together. Examples of such tools are blogs, Really Simple Syndication (RSS) software, social bookmarking tools, and WIKIs.

Secondly, de Laat shows that it is not necessary to use an expensive LMS for online collaboration; "small pieces loosely joined" could provide an adequate learning solution as well. In fact, social software might provide a starting point for the personalisation and individualisation of learning.

De Laat makes a distinction between learning in social interactions and collective learning. Furthermore, he subdivides collective learning into learning in networks, learning in teams, and learning in communities.

Advantages and disadvantages of e-learning

Only a couple of years ago e-learning was regarded as the education form of the 21st century. In the meantime it has become clear that e-learning cannot replace the traditional forms of education completely. e-learning can only be an important support in the whole learning process. Learning can be optimised by the combination of different approaches of knowledge transfer. This is very important for students that prefer using the computer and the Internet instead of reading books. They can profit from the usage of e-learning in particular.

The usage of different media types is only responsible for a minor part of the success of the learning process. Therefore, it cannot be claimed that e-learning assures more efficient learning.

Only if a high number of factors come together, e-learning can be successful.

Advantages

The biggest advantages of e-learning are the possibilities and flexibility it offers. The student can learn when and where he wants and at his own learning pace. This makes e-learning education excellent for students that are working full-time or have family responsibilities. The students and their learning are independent of spatial and temporal borders. The transfer of knowledge can take place regardless of the physical presence of the student. This is realised by the usage of computers, the WWW and LMSs.

Another advantage is that e-learning courses can be interactive, the learning outcome of the student can be monitored individually and the learning content can be adapted to the students specific learning preferences.

Additionally, the economical aspects must be counted among the advantages of e-learning. The costs of learning can be reduced, for example if a student wants to repeat a learning session, he can simply restart the e-learning material without any additional costs. Furthermore, existing e-learning material can be reused for different students or institutions. Generally, it can be claimed that the initial costs are higher with e-learning, but the more users are using the once produced material, the more costs are avoided.

Other advantages of e-learning are the possibility that students can communicate or collaborate with fellow classmates regardless of spatial distance and that educational material can be adapted to the learners' preferences. Additionally, difficult topics can be visualised or presented with simulations.

However, e-learning does not only have advantages but some disadvantages as well.

Disadvantages

The first disadvantage of e-learning is that students and learners must first learn to work with the new forms of learning, knowledge transfer and media types. Additionally, the presentation of the educational content is often dominated by technical aspects instead of educational aspects. This is based on the fact that e-learning is influenced by technology and technical experts that create the content.

Another disadvantage of e-learning is the missing face-to-face communication between the students and the teacher and these issues can make personal tutoring very difficult. However, the application of teleteaching or virtual classrooms could address this issue. Sometimes students state that they experience a feeling of isolation in the process of distance learning. However, the application of forums and computer based communication forms can help to overcome this obstacle. Furthermore, if collaborative e-learning is used, the students need to be very disciplined during their work to avoid delay times during the communication

between the students.

Another issue that has to be acknowledged is that the implementation of e-learning can be very expensive during the initial phase.

Conclusion

However, taking everything into consideration, the advantages outweigh the disadvantages of e-learning.

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