

Chapter 1

E-Learning

1.1 Introduction to E-Learning

The term *e-learning* refers to a number of different methods, concepts and techniques. It is therefore difficult to confine the term sharply. Thus, in literature, there are different definitions of what e-learning is and what it is supposed to be. Rosenberg (2006) defines e-learning as follows:

E-learning is the use of Internet technologies to create and deliver a rich learning environment that includes a broad array of instruction and information resources and solutions, the goal of which is to enhance individual and organizational performance.

Rosenberg defines e-learning purely by terms of instruction and information resources. Further, *the use of Internet technologies* is seen as a necessary condition for e-learning. The definition does not take into account educational software.

Richert (2007) criticises the definition of Rosenberg because she sees no reason for such equality of terms. She constitutes her view with the fact that electronic (learning) applications are not limited to the Internet. Richert (2007) defines e-learning as:

Unter E-learning wird das computergestützte Lernen (vorwiegend von Einzelpersonen) mit hypertextbasierten, multimedialen, interaktiven Systemen verstanden, das zeit- und ortsunabhängig sowohl online als auch offline erfolgen kann.

in English:

E-learning is defined as computer-aided learning (mainly by individuals) with hypertext- and multimedia-based interactive systems. The learning process can take place independent of time and location both online and offline.

It is important to note that the term is broader than the definition of Rosenberg, but is restricted to *learning systems*. That means concretely that electronic media like dictionaries may be included in e-learning systems as a tool, however, they can only form a part of a more general e-learning environment. Electronic media itself is not necessarily understood as e-learning system.

1.2 Classification of E-Learning Systems

E-learning systems can be classified by their their degree of freedom for user interaction. On one end of the scale there are *Drill-and-Practice* programs that do not allow for freedom of interaction. On the other end there are interactive programs allowing the user to interact and control the application. Judged by the definition of Richert this classification does not seem very suitable (Richert 2007).

Another possibility to classify e-learning systems is the the kind of storage media used. This classification allows for a distinction between *online* and *offline* e-learning systems. *Offline systems* are those systems that are offered on passive storage media like floppy disk, CD-ROM. Offline systems are usually called *Computer Based Training* (CBS) systems. *Online systems* on the other hand are web server based systems that fall under the category of *Web Based Training* (WBS) systems (Richert 2007).

Additionally, Richert (2007) defines *hybrid systems* that are CBT systems but use the Internet as a means of communication with other learners. Table 1.1 shows the classification of e-learning systems after (Richert 2007).

		Using the WWW as storage medium	
		Yes	No
Using the Internet for communication	No	WBT	CBT
	Yes	Learning platforms	Hybrid CBT

Table 1.1: Classification of e-learning systems

1.3 Technical Context of E-Learning

1.3.1 Multimedia Systems

The term *Multimedia* has several definitions. Simple versions of multimedia definitions state that multimedia refers to a combination of different forms of information from several sources. Those forms can contain textual information, graphic, video and audio. With a broad definition of that kind any television news report could be regarded as multimedia. Richert (2007) understands *multimedia* more holistically than that. She sees multimedia as a technological concept that allows for the interaction of a user and a multiple media system. More than one sensorial modality should be should be presented by the system.

1.3.2 Classification of Interactivity

Interactivity can be defined in several steps. The concept of *interaction* serves as a basis for the classification, because in a sociological sense there can, by definition, be no mutual interference between man and machine. Interactivity in the sense of interaction comprises the ability to access and control different functionalities of a software system (Richert 2007).

Six classes of interactivity can be described. They differ by their degree of interaction between the user and a software system. The gamut of interactivity is used to evaluate e-learning applications:

1. **View and absorb objects**

The hypermedial components can be viewed and played by the user. The user can not further influence the components in any way.

2. **View and absorb multiple displays**

Program components offer more than one display. For instance, a user could click on a picture and be shown a different one. No modification of components is possible.

3. **Varying the form of representation**

On this level, users can gain the feeling they could actively influence the multimedia components. They can scale objects or view them from different perspectives. Users can influence the form of representation but not the content.

4. **Changing the content of a component - parameter or data variation**

Contents of a multimedia component are generated by the user. Users can input data or text. They can not change films or pictures. A usage example of that type could be the selection methods of statistics programs. Users can modify objects and the program yields different results.

5. **Generating objects or the content of a representation**

This mode of interaction is reached by applications that offer tools to create and change content. For example visualise thoughts with mindmaps, or render new forms and models.

6. **Constructive and manipulative actions through situation-dependent feedback**

On this level of interaction symbols can be manipulated and the result of the interpretation can be interpreted by the program. That allows for the generatoin of useful and context-sensitive feedback. User input can be evaluated by the application.

The gamut is described after (Richert 2007).

1.4 Pedagogical Context of E-Learning

The pedagogical context of e-learning is a crucial part of any e-learning environment. The learning targets need to be defined and a conceptual design of a software needs to be based on those.

1.4.1 Learning

The term *learning* is of a complex nature. A definition of learning is therefore never sharply confined. The definition of *learning* by Lefrancois (1994) shows how broad the term can be perceived:

Lernen umfasst alle Verhaltensänderungen, die aufgrund von Erfahrungen zustandekommen.

In English:

Learning compasses all changes in behaviour that are based on experience.

The changes in behaviour include those processes that do not aim at acquiring information, but also those changes in behaviour of an unknown cause (Lefrancois 1994). According to (Richert 2007), this means the acquisition of competences of different kinds.

1.4.1.1 Educational Objectives

Cognitive learning targets comprise all targets that include acquisition of knowledge. Knowledge can refer to both reproduction of content, but also acquiring the ability to solve problems. The area of cognitive learning targets can be differentiated further. Richert (2007) distinguishes the acquisition of:

- **Declarative knowledge or factual knowledge.** Knowledge that can be categorised as *knowing that* as opposed to *knowing how*.
- **Procedural knowledge or dynamic knowledge.** Knowledge that contains approaches to problems and their resolution procedures. Procedural knowledge can be seen as a series of declarative inventory of knowledge, nevertheless it can be categorised as *knowing how*. The distinction to the regular ability of a human to solve problems lies in the fact that declarative knowledge is needed in order to solve specific types of problems. For instance, in order to be able to successfully use a map for navigating, a human needs to know that a certain object is a map, what the symbols on the map mean and where or what the four cardinal points are.
- **Contextual knowledge.** Knowledge that contains application situations. This category is centred around *when and where* to apply knowledge. What abilities and which factual knowledge can be used in which situations?

Affective learning targets are educational objectives that aim at changing behaviour. It is difficult to actualise affective learning targets by cognitive learning only. In order to achieve affective learning targets, feelings, evaluations and attitudes of humans need to be taken into account. In learning situations at school often personal enthusiasm, credibility and charisma of the teacher play a role (Richert 2007).

Psychomotoric learning targets is the class of learning targets that aim at the acquisition of manual abilities and motion sequences. That includes playing of musical instruments or using tools. Analogue to the procedural knowledge learning, theoretical knowledge about the objects involved is necessary in order to achieve the psychomotoric abilities. That theoretical knowledge is a necessary condition for the psychomotoric learning process, but it is not sufficient, psychomotoric learning involves practising motoric sequences (Richert 2007).

1.4.1.2 Self-Driven Learning

Learning is often seen as a behaviourist stimulus-reaction process. Different views observe an active and constructive process. In the constructionist view on learning there is a continuum from *self-learning* to *autonomous learning*. *Self-driven learning* can be classified by that continuum.

Self-learning defines a type of learning with a focus on the self-initiative and self-responsibility of a learner. Richert (2007) reports of the opinion that it is impossible to not self-learn, because learning always assumes the intention of the learner. This view conjectures that each learner has to accomplish the task of self-construction of knowledge. However, self-learning defines solely the self-initiative of the learner, the learning material is provided by an external source.

Autonomous learning is distinct from self-learning in the way, that it focuses on teacher-independent organisation of learning. While in self-learning, the learner can decide to learn, independently of a teacher, in autonomous learning the learner is self-responsible for defining learning targets and has an analytical view on the learning process (Richert 2007).

Self-driven learning is a type of learning that can be seen somewhere on the continuum from self-learning to autonomous learning. In self-driven learning the learner is given all instructions and decisions concerning the learning process in the learning materials. The self-direction is therefore limited to the location and the time of learning (Richert 2007).

1.4.2 Intelligent Tutorial Systems

Intelligent tutorial systems fall under the paradigm of cognitive learning. The general scheme of such a system is depicted in figure 1.1 after (Richert 2007). The declarative knowledge of a system is stored in the expert module. The student module holds information about the learning progress and the course module holds the lessons of the application. The communication module interacts with the learner.

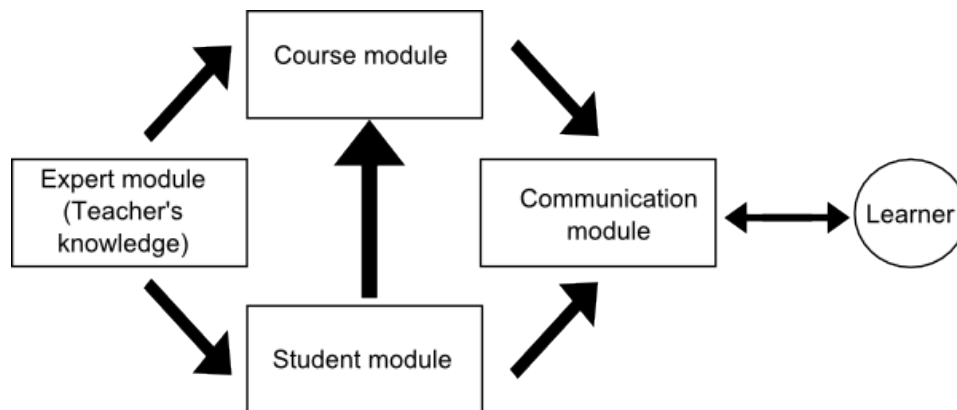


Figure 1.1: General scheme of intelligent tutorial systems

1.5 E-Learning of Languages

strengthening of competences (s.96) richert: s. 95 97ff

1.6 E-Learning of Japanese Script

1.6.1 Conceptual Issues for E-Learning of Kanji

1.6.2 Classification of a Kanji Teaching Application

computer assisted language learning: (Bailey and Meurers 2008)

(Zimmer 2009) Bildung durch e-learning. allgemeine aspekte (Stahlmann 2004) spezielle aspekte bezueglich han-trainer pro (Hettinger 2008) wie kann man e-learning in der schule einsetzen? e-learning: grundlagen, modelle, perspektiven

(Richert 2007) breite einfuehrung in e-learning theorie.

(Seel and Ifenthaler 2009) sehr breite allgemeine einfuehrung ins online-lernen (Ivašin 2009) kritik an der technischen dominanz in elektronisch unterstuetzten lern- und lehrprozessen.

(Stark et al. 2002) comparison of two e-learning apps.

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