Chapter XV
From E-Learning Tools to Assistants by Learner Modelling and Adaptive Behavior

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ABSTRACT

Humans need assistance in learning. This is particularly true when learning is supported by modern information and communication technologies. Most current IT systems appear as more or less complex tools. The more ambitious the problems in the application domain are, the more complex are the tools. This is one of the key obstacles to a wider acceptance of technology enhanced learning approaches (e-learning, for short). In computer science, in general, and in e-learning, in particular, we do need a paradigmatic shift from tools of a growing complexity to intelligent assistants to the human user. Computerized assistants that are able to adapt to their human users' needs and desires need some ability to learn. In e-learning, in particular, they need to learn about the learner and to build an internal model of the learner as a basis of adaptive system behavior. Steps toward assistance in e-learning are systematically illustrated by means of the authors' e-learning projects and systems eBuT and DaMiT. These steps are summarized in some process model proposed to the e-learning community.

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TECHNOLOGY ENHANCED LEARNING: PROS AND CONS

Technology has always been changing humans' lives, and the impact of science and technology has frequently been even deeper and longer lasting than expected at the beginning of a change. We are currently experiencing substantial changes driven by information and communication technologies, in general, and by the Internet pervading work places and private homes, in particular.

In the area of education ranging from elementary schools through universities to continuing education and life-long learning, information and communication technologies are paving the road for fundamentally new learning experiences.

The pros of e-learning are discussed in many publications, sometimes even organized toward formation of a strategy as in Igel and Daugs (2002), for example. There are convincing summaries of the benefits of technology enhanced learning for the industries. Tom Kelly, CISCO's vice president of worldwide training, circumscribes it as follows:

E-learning is not the answer to every question, but it needs to be applied as broadly as possible. The classroom simply cannot address business issues. If you have to teach 100 people about one topic, you can train 25 people in a classroom at a time and repeat the course four times. But if you have to train 3,000 people every 60 days on a new product, or on a new technology, or on a new market—there's no way that the classroom can work. There's no way to scale. There's no way to have an impact on the company. It is doomed to fail.

(http://fastcompany.com/magazine/39/quick-study.html)

Motivations to get engaged in e-learning are expectations of added value of new media and added value of information and communication technologies like, for instance, independence of time and place—learning anytime, anywhere (Igel & Daugs, 2002).

From a didactic point of view, there are options for new concepts as situated learning and exploratory learning. Strategic options are ways to address wider audiences, off campus vs. on campus, bridging the gap from the academia to distance education and life long learning and, last but not least, new approaches to controlling in education through the exploitation of learning histories and technology-supported cost analysis.

There is an obvious convergence of technologies and media (computers and computer networks, television, audio communication), promising connections of online and off-line media, and emerging mobility in IT services.

In contrast to the pros, there are plenty of cons as well. Who properly works in the area of e-learning, not only as a "technology provider" (This word sounds like an excuse for scientists and engineers who do not care about how to wield the tools they are producing.), but employing e-learning in regular use, rapidly learns about a variety of difficulties. If you do so, you are also facing learners' frustration for several reasons.

Learners' most frequent complaints refer to missing or inappropriate feedback. Learners feel *misunderstood* by computers. In fact, nowadays all human learners *are misunderstood* by their computers, as computers are far from understanding anything—there is no need for a Chinese Room argument (Searle, 1980) to clarify this.

Here, a brief explanation seems to be necessary, as one of the reviewers of this chapter claimed that "the reference to a Chinese Room Argument is irrelevant, because the chapter deals with what current technology can deliver, while the work of Searle deals with the philosophical limits of computers." What a misunderstanding!

The present chapter does *not* deal with current technology, that is, tools in e-learning, but with steps towards future assistant technologies, thereby touching the rather philosophical ques-

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