

# Completing Design Concepts for Lifelong Learning

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**Abstract:** Lifelong learning denotes learning as a process, which continues after leaving school. This perspective has a far-reaching influence on conceptual design models of educational software. It regards learning as one aspect of work and opens the way to including concepts from industrial psychology into software design. This paper will discuss factors influencing the learning process, such as burden, demand level or motivation, and the resulting consequences for the development of educational software.

## Lifelong Learning

Lifelong learning denotes that learning does not end after finishing school or university. More and more people have to attend courses in further and continuing education to keep their knowledge level and market value or to gain knowledge for another kind of professional work. Situations demanding for learning will be pervasive in people's life and in consequence the division between education, work life and leisure time will fade.

### Learning is one aspect of work

Understanding lifelong learning as a permanent process also involves the perspective on learning as one aspect of work. This view allows us to integrate concepts from industrial psychology into conceptual models shaping the design of educational software. Industrial psychology has a holistic view on human nature. Humans are supposed to search for self-realization and autonomy, which should be supported by changes in work places and organizational structures in order to enlarge the individual's area of responsibility. It involves personality development, formed in the individual's tackling with challenges provided by solving the tasks at work.

Industrial psychology deals with aspects of qualification. Learning tasks are viewed as a sort of chain, where burden and demands alter with effects on the change of mental states. In order to initiate successful and effective learning processes it is most important to find an adequate demand level, which causes positive mental states like happiness, motivation, increase in performance and, in the long distance, even qualification and positive development of personality. On the other side, inadequate demand levels cause negative and undesirable mental states, e.g. a feeling of tiredness, drop in performance, frustration, and even psychosomatic illness.

### Lifelong Learners

It is a challenge to develop educational software, which is adaptable to burden and demand level. Software designers have to find concepts and techniques to make software as flexible and interactive (Fischer 1996) as to adapt to altering demand levels. One step into this direction is to orient teaching strategies to the characteristics of groups of learners, which may be deduced by taking into consideration the context of learning and the purpose. One can distinguish different learner groups. For example, learner group 1 wants to do basic studies in the domain in order to pass exams and earn diploma. The learners want to study all modules relevant to the curriculum, need guided tours to differ relevant from irrelevant knowledge with respect to passing exams. Learner group 2 does not want to go

through all the knowledge modules offered in the database, but wants to study only some modules for task-oriented knowledge acquisition. Often a current problem or a knowledge gap is the starting point for learning. Learner group 3 is characterized by exploring the knowledge domain according to personal interests. The behavior of learners in this group is comparable to browsing libraries, reading books and magazines.

## **Conceptual Modeling**

The important role of the conceptual model for the development of educational software has been strengthened by didactics as well as by software-ergonomics (Herczeg 1994). With this background in mind, we want to ask what kind of conceptual models do developers of educational software have in mind.

## **Theories of Learning and Teaching**

Theories of learning and teaching, which are mainly derived from psychology, normally shape the conceptual models of educational software developers. Examples are behaviorism, cognitive information processing, theories on constructive and situated learning. In the early phase of computer-based training, dominated by behaviorism, reinforcement, serial ordering, small chunking were seen as the basic mechanism enabling learning processes. Information processing approaches focused on cognitive aspects of knowledge representation like conceptualization or schemata. Other theories strengthen the vital role of experience for the learner's perception and activities in knowledge construction, which change cognitive structures (Bonner 1998), stressing the importance of communication and social negotiation as inevitable for learning processes to occur.

## **Task Analysis**

Learning theories focus on either behavioral or on cognitive aspects of the learning process. However, software-ergonomics claims that conceptual modeling should also take into consideration the domain, the user's skills and experiences, certain cognitive aspects (like memory capacity, laws of perception etc.), and also the task and the context of completing the task. Especially task and task contexts have been neglected by current psychological theories. Task analysis intends to reveal relevant characteristics of the learner and her or his task (Herczeg 1999). Some aspects of the learner's task have been discussed in the section on lifelong learners. The three groups mentioned above may further differ according to aspects like previous knowledge, learning style and motivation. For example, not the aspect of being motivated is important, but the reasons that cause motivation. That is, the distinction between intrinsic and extrinsic motivation, as intrinsic motivated learners will hardly ever need external stimuli, whereas others do.

## **Summary**

Regarding lifelong learning as one aspect of work enriches developer's conceptual models with concepts from industrial psychology. An important aspect is task analysis in order to shape the task according to demand levels. Task orientation means that interests and engagement are caused by characteristics of the task itself. The conditions are to give a person as much control as possible over the subtask and over the devices for task completion. Furthermore, the task has to be structured in a way that the level of burden and demands is adequate. Too simple or less structured tasks will result in monotony or disappointment. More research on this subject is needed in order to develop educational software with a more holistic model of the learner, and by the way improving job and learning conditions, and last but not least preventing illness.

## **References**

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