

Learner Characteristics

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LEARNER CHARACTERISTICS

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Synonyms

Learner profile, learner model

Definition

The concept of *learner characteristics* is used in the sciences of learning and cognition to designate a target group of learners and define those aspects of their personal, academic, social or cognitive self that may influence how and what they learn. Learner characteristics are important for instructional designers as they allow them to design and create *tailored instructions* for a target group. It is expected that by taking account of the characteristics of learners, more efficient, effective and/or motivating instructional materials can be designed and developed.

Learner characteristics can be personal, academic, social/emotional and/or cognitive in nature. *Personal* characteristics often relate to demographic information such as age, gender, maturation, language, social economic status, cultural background, and specific needs of a learner group such as particular skills and disabilities for and/or impairments to learning. *Academic* characteristics are more education and/or learning related such as learning goals (of an individual or a group), prior knowledge, educational type, and educational level. *Social/emotional* characteristics relate to the group or to the individual with respect to the group. Examples of social/emotional characteristics are group structure, place of the individual within a group, sociability, self-image (also feelings of self-efficacy and agency), mood, et cetera. Finally, *cognitive* characteristics relate to such things as attention span, memory, mental procedures, and intellectual skills which

determine how the learner perceives, remembers, thinks, solves problems, organizes and represents information in her/his brain.

With respect to learner characteristics, there are often large differences between the characteristics of different learners and groups of learners such as children, students, professionals, adults, older people and disabled persons. These groups differ in their motivation, prior knowledge, expertise level, study time, and physical abilities. The differences within the learner characteristics have an impact on the structure of the instruction and the degree of *support* and *guidance* of the learning process.

Theoretical Background

The theoretical roots of learner characteristics can be traced back to Witkin (1949; 1978, p. 39) who saw them as a “characteristic mode of functioning that we reveal throughout our perceptual and intellectual activities in a highly consistent and pervasive way”. In other words, learner characteristics are seen as traits (i.e., characteristic of the learner and, thus, not easily influenced) and not as states (i.e., characteristic of the situation in which the learner finds himself/herself and, thus more easily influenced). As early as 1949, Witkin published research related to field dependence/field independence. Field dependent people have difficulty separating an item from its context while a field independent person can easily break up an organized whole into its relevant parts.

A second driving force with respect to learner characteristics – and especially cognitive learner characteristics – was Guilford who referred to them as intellectual abilities (Structure of Intellect Model, 1967). He organized these abilities along three dimensions, namely operations (cognition, memory, divergent production, convergent production, and evaluation), content (visual, auditory, symbolic, semantic, and behavioral) and products (units, classes, relations, systems, transformations, and implications). Guilford saw these dimensions as being independent of each other yielding, theoretically, 150 different components of intelligence on which learners can differ.

With respect to the coupling or use of specific instructional approaches for specific learner characteristics, Cronbach and Snow (1977) posited their model of Aptitude-

Treatment Interactions which held that certain instructional strategies (i.e., treatments) will be more or less effective for different individuals depending upon the individual's specific abilities (i.e., aptitude). This model presupposes that optimal learning is the result of the instruction being perfectly matched to the learner's aptitudes.

Important Scientific Research and Open Questions

Though there are many important questions, these can be categorized into major categories namely:

What learner characteristics are - or may be - truly important for making learning more effective, efficient and/or enjoyable? There is no such thing as 'the' learner characteristic(s). Learning characteristics are highly individual and vary for every learner. Are there certain characteristics that are more important (i.e., play a greater role in influencing how instruction affects the learner) than others? Instructional designers must constantly deal with new and differing groups of learners and thus must make decisions as to what characteristics of the target group are most important when tailoring instruction.

Is it possible to discern different learning styles and how do we do this? There is much debate as to whether learning styles actually exist. Pashler, McDaniel, Rohrer, and Bjork (2009) conclude that the "contrast between the enormous popularity of the learning-styles approach within education and the lack of credible evidence for its utility is, in our opinion, striking and disturbing. If classification of students' learning styles has practical utility, it remains to be demonstrated" (p. 117).

Are preferred learning styles as reported by learners really suitable for tailoring instruction? If this is the case, learners with certain learning characteristics would get certain learning materials allocated to them. As a consequence the learners receive learning content that fits to their preferred learning style. This approach is contentious for a number of reasons, for example because (1) what learners say that they do while studying does not usually correspond to what they actually do, (2) even if this were not the case, learners prefer not only one learning approach, but rather certain learning

styles for particular situations, and finally (3) is that which is preferred actually what is best for the learner (Kirschner, Sweller, & Clark, 2006).

Current research on learner characteristics impacts the personalization of learning within the field of Technology-Enhanced Learning (TEL). In TEL, personalization is a key approach to overcome the plethora of information in the Knowledge Society and especially of adults and professionals. It is expected that personalized learning has the potential to reduce delivery costs, create more effective learning experiences, accelerate study time to competence development, and increase collaboration between learners.

TEL researchers use the definition of learner characteristics from the sciences of learning and cognition as meta-data fields to create so-called *learner models*. Such learner models are customized to the target group of a TEL-environment. Most often it contains learning goals, prior knowledge levels, and certain personal preferences that a learner can specify in a learner profile. An open research question is: What is the best way to aid learners in making learning in a TEL environment more personalized, effective, efficient and/or enjoyable? In the early e-Learning days, TEL researchers tried to match learning content or adjust a learning environment to the information a learner personally entered in a learner profile. Nowadays, the learning characteristics meta-data fields are filled with statistics based on different mathematical methods of modeling a learner. These methods take into account the dynamic behavior of learners in a TEL learning environment. Thus, they record learner activities such as most viewed pages, time spent on pages, written texts from blogs, comments on others or on discussions boards, contributed hyperlinks and their content, and so forth to create a learner model. The collected information is gathered and clustered in the learner characteristics meta-data fields. Based on this mathematical model, every learner receives a score for each of the learner characteristics. This score can be compared with the score of other learners and with the content in a TEL environment by similarity measures. There are various combinations of similarity measures possible and it is an open question which of them model a learner most accurately. One major challenge of the current research is to find suitable evaluation criteria to compare the different learner model ap-

proaches. A good overview about the different learner modeling approaches can be found in Manouselis, Drachsler, Vuorikari, Hummel, and Koper (2010).

Cross-References

- Abilities and learning
- Aptitude-treatment-interaction
- Knowledge representation
- Learner preferences and achievement
- Learning styles
- Role of prior knowledge in learning processes

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