

E-Learning through HCI

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INTRODUCTION

E-government is using electronic technology to streamline and/or to improve the business of government and, as a result, to improve its citizens' personal services; for example, patient hospital appointment booking systems, electronic voting, and the development of e-education. E-education and, from this, e-learning depend not only on the quality of the content but also on that of the human-computer interaction (HCI) generated by designers and implementers of a system.

HCI is a cross-discipline subject that covers a wide area of topics, many of which need to be considered in e-learning, that directly affect the student, the tutor, or the administrator. HCI delivering e-learning includes issues such as psychology, sociology, cognitive science, ergonomics, computer science, software engineering, users, design, usability evaluation, learning styles, teaching styles, communication preference, personality types, neurolinguistic programming language patterns, and so forth.

This article considers interpersonal communication and the effective transfer of knowledge from one human to another (e.g., a teacher to a learner) in the real world; it then postulates on their replication in distance/e-learning. The article focuses on the factors required for effective e-learning in the field of HCI for education. In particular, it introduces the concept of using communication preference (CP) and learning styles/personality types (LS) in an intuitive interactive tutorial system (in TS). The development of WISDeM (Web Intuitive/interactive student distance education model) by the authors significantly exemplifies this in its evaluation results.

BACKGROUND

In this section, we discuss distance learning, learning and teaching, CP, LS, neuro-ergonomics, neurolinguistic programming (NLP), and NLP language patterns.

Distance/E-Learning

Distance/e-learning is training that can be (1) live instruction that is conveyed in real time via telecommunications facilities, (2) accomplished on a point-to-point basis or on a point-to-multipoint basis, and (3) conveyed in many forms (teleseminar, teleconference, electronic classroom, using text and/or audio and/or video). In essence, a live tutor or computer tutorial system trains the learner when the learner is at a different geographical site and sometimes at a different time. Currently, the live tutor has the ability to adapt to the learner as relevant—computer tutors do not replicate this ability.

Lawler and Yazdani (1987) consider that a computer tutor, in order to provide adaptive instructions, must have a strategy that translates its tutorial goals into teaching actions and that, as a consequence, research on teaching strategies is central to the construction of an intelligent tutoring system. Programming the computer tutor can adapt it dynamically at runtime to (1) focus on the fluctuating cognitive needs of a single learner over time and (2) output content and form of knowledge and/or instruction to the learner's understanding of the subject matter. In order to provide adaptive instruction, a tutor must have a wide range of instructional actions (the principal of versatile output). One learner may need a definition; another may need an explanation. Ghaoui and Janvier (2004) ask, "What about changing the output to match both the learner's communication preference and learning styles?"

Learning and Teaching

Every teacher is a learner; thus, while we consider learning and the way we learn, the corollary is that teachers use their learning experiences to teach and to develop their own preferred teaching styles. Cotton (1995) considers that learning usually is the active process in which the learner remembers the input of an instance and interprets this input subject to preconceptions. The input and retention of some instances can be the result of passivity (e.g.,

knowing that an insect bite can hurt normally is not the result of active learning). Learning enhances the ability to learn that practice makes perfect.

Gagnon, Collay, and Gagnon (2001) consider that the art of constructing meaning out of instances results in a learner learning to learn (constructivist learning). Crucially, this is a cognitive mental activity. While the input of instances well may depend on physical action, the cognitive consideration of those inputs depends on reflection of those inputs (reflective learning) (Coffield, Mosley, Hall, & Eccleston, 2004). There are many styles supported and adopted by teachers for passing on their own knowledge to students, while students exhibit their own personal learning styles based on their personality and life experiences (Janvier & Ghaoui, 2002).

A basic point to remember is that in order for conscious communicative learning to take place, passage of information between the teacher and the learner relies on the use of a jointly understood language, and the use of words is subject to the possibility of misinformation. What the learner understands words to mean may not be what the teacher means, which can be exemplified by the following problems: (1) *preconceived ideas*—the learner tends to ignore what he or she thinks is known or is like something that is known; (2) *ashamed to admit lack of knowledge*—the learner does not like to admit that the communication being used is not understood; and (3) *loss of interest in the communication*—clarification and confirmation of understanding is essential (Cotton, 1995).

A learner usually transfers sensual input into permanent input by rehearsal—the repeated exposure to a new idea or fact—the way the brain revisits experiences while we sleep. Waking up with some instantaneous inspiration is not instantaneous; the brain has been working at the subconscious level before recall makes it conscious (Catania, 1992). A learner also requires the correct type of feedback; inappropriate feedback or classical conditioning (e.g., destructive criticism) creates an ever-increasing barrier to learning (Cotton, 1995).

A tutor has a preferred style of communication, which influences his or her choice of teaching style or theory in a given instance. If this communication style matches the student's preferred communication style, then excellent communication takes place, if not, communication is less effective. Thus, in order to be fully effective, a tutor needs to temporarily adjust his or her communication style to that of the student's (Catania, 1992).

Communication Preference

Everyone has his or her preferential technique(s) in order to exchange ideas with others, acquire knowledge, and pass knowledge along to a third party. This is called

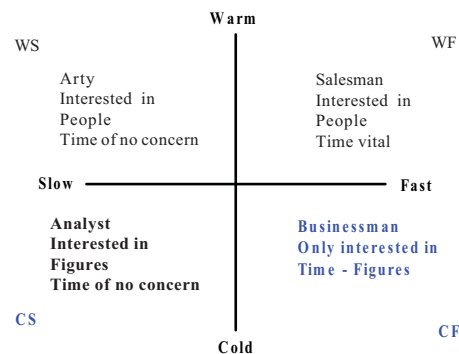
communication preference, which has been the basis of much research (Janvier & Ghaoui, 2003b). Almost all learning is external to the body; one of the five senses (touch, sight, taste, hearing, and smell) introduces it. The input is filtered, interpreted, and assessed against previous input, beliefs, and concepts using perceptual constancy, perceptual organization, perceptual selectivity, and perceptual readiness. Stored instances are not a true representation of the actuality due to the fact that they already have been distorted by the subject's own interpretation of the facts as perceived by the inner voice, eye, ear, nose, and taste (Cotton, 1995).

Personality Types

Different personality types require different communication treatment. It is possible to plot all these types somewhere on the WC/SF scale, as seen in Figure 1.

- **WS types** prefer the company of others, are slow to make decisions, take their time, and sometimes will not make a final commitment. They get along very well with other WS types and often communicate well with WS and WF types; they do not like the CF type. They can be categorized as *Arty*.
- **CS types** prefer their own company, are slow to make decisions, take their time, and sometimes will not make a final commitment. They are very precise, and they get along very well with other CS types. They often communicate well with WS and CF types; they do not like the WF type. They often are categorized as *Analytical*.
- **WF types** prefer the company of others, are fast to make decisions, and often make a commitment before thinking it through. They get along very well with other WF types and often communicate well

Figure 1. Personality types (Janvier, 2004)



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