Developing a Web-Based Heuristic Advisory System for Instructional Designers

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Abstract

Although there are several dozens of instructional design models and a lot of empirically founded principles of instructional design, there is a lack of integration preventing us from sound recommendations for instructional designers. The contribution presents a research and development project aiming at the development of a web-based heuristic advisory system for instructional designers. In fact, such an advisory system is a representation of an integrated technological theory. The advisory system contains three modules: an information assessment unit, the knowledge base, and an advisory unit. The most difficult part of the project is the definition of the relations between input information and design options.

1 The Problem

The two most complained problems concerning instructional design are (a) the very limited practical application and the dissipation of the different ID models, (b) the lack of an integration of theories, models and relevant results of empirical research. Teachers and designers miss hints, which model could be best applicable under given conditions and whether or when it may be more appropriate to blend elements from different ID models.

Necessary prerequisites for any serious recommendation of this kind are (a) a functional analysis of current instructional design theories, and (b) a technological theory which relates elements or modules from instructional design models to combinations of instructional objectives and internal and external conditions of learning. Such a theory does not yet exist.

2 ID - Hypertheory

Our work aims to construct such a theory which will be represented by a kind of an expert system (knowledge based advisory system). The idea of representing a technological theory by an expert system is analogous to the representation of a descriptive theory by a simulation system (e.g. J.R. Anderson’s ACT-model; [1]). A software system representing a technological theory has to prove it’s worth by providing suggestions that are in the average (a) for the short term not worse than decisions made by practitioners of ID with less experience and (b) in the long run not worse than recommendations given by ID experts.

Such a theoretical framework – we call it an “ID hypertheory” (Niegemann, 2001) – ideally should contain an integration of empirically founded knowledge relevant for the solution of instructional design problems.

This is clearly a rather ambitious project and there will be continuously new knowledge to be integrated. We don’t think we can make it alone after some pioneer work. Thus, the philosophy is to invite researchers to submit their results to be admitted and integrated into the ID hypertheory. Proposals for admittance will be peer-reviewed analogous to the reviewing process for papers to be published in scientific journals. An admittance into this system should be a prove of the practical relevance of a project.

The advantages of building an ID hypertheory are in the beginning more on the side of the theory: Like simulation models representing descriptive theories of memory and thinking, theory makers are forced to formulate unambiguous statements, contradictions between different statements will necessarily be uncovered and lacks of knowledge become evident.

1 “We” are two cooperating research groups at the Technische Universitaet Ilmenau and the Universitaet Koblenz-Landau at Landau (both Germany) working on this research program: W. Schnotz, H. M. Niegemann, M. Molz, A. Eckhardt and D. Hochscheid-Maue
Recommendations produced by the system will not be directive. Rather like an experienced business consultant the system will successively show for every level of design decisions the appropriate design options, connected costs and possible consequences. Similar to expert systems in medicine it should be a decision support system, i.e. the final decision is never made by the software but by the human instructional designer. The architecture of the system contains three modules:

- An information assessment unit
- A knowledge base
- An advisory unit

3 State of the Project

A first phase of the projects has focused on the functional analysis of existing instructional design models [3] to determine (a) main categories of “functional elements” used in ID models and (b) main levels of design decisions.

The second phase has been the provisional definition of the information the system must assess from users: Instructional objectives, including the kind of knowledge or the competencies to be fostered, relevant traits of the target group (knowledge, motivation, composition) and the contextual conditions (time, budget, competencies etc.). The current phase is the core phase and the most difficult one: The definition of relations between instructional objectives and the other input variables on the one hand and the options available on any level of the process of designing multimedia learning environments on the other hand.

References