

INUITEL

Intelligent Tutoring Interface for Technology Enhanced Learning

Christian Swertz, Universität Wien
Eran Gal, Dan Kohen-Vacs (Holon Institute of Technology)

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1 Einleitung

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Project representative to be contacted for further info: Christian Swertz (christian.swertz@univie.ac.at), Eran Ga (erang@hit.ac.il), Dan Kohen-Vacs (mrkohen@hit.ac.il)

The objective of INTUITEL is to enhance state-of-the-art Learning Management Systems with individualized recommendations for navigation and feedback on learning strategy. To do so, learner behaviour is monitored and combined with ontologies created by pedagogical experts. Recommendations and feedback are deduced by automatic reasoning.

The educational starting points are the freedom of the individual learner, the

open future of the learner and the temporality of teaching and learning processes. The educational objective is to create an environment where the dynamic of the connection between the pedagogical ideas of the teacher and the interests of the learner is increased. To reach this, the metadata system and vocabulary of Web Didactic are used. Web Didactic provides a simple metadata system that differentiates between concept containers (topics) and knowledge objects (content). Concept containers and knowledge objects are both connected by typed relations, where the relation type expresses a specific learning pathway.

With INTUITEL, teachers use the typed relations to express their recommendations for learning pathways. Different learning pathways, like deductive or historically forward between concept containers and multi stage learning and inquiry based learning among knowledge objects, can be suggested in the same course. Learners can pick one of these pathways. Suggestions of the teacher, selections of the learner, log data and profile data are combined to calculate recommendations and feedback. In order to enhance LMSs with the INTUITEL system, interfaces were specified and developed for four example LMSs (ILIAS, MOODLE, CLIX, EXACT). These interfaces provide connectivity for the INTUITEL system and a window where recommendations and feedback for the learner are presented. These interfaces can also be added to an existing course without adding metadata. In that case, only log data and learner profiles are used to calculate recommendations and feedback. To express learning pathways, an external editor has been developed that connects to the LMS through the LMS interface. Additionally, content can be described by attributes like “suitable for blind” or “estimated learning time”. If provided, these attributes will be considered to calculate recommendations and feedback.

In INTUITEL, an ontology based approach is used. The system is based on an enhanced OWL framework and an OWL 2 DL reasoning framework. A layered set of ontologies has been developed. The first layer is a pedagogical ontology which instantiates concept containers, knowledge objects and

offers a vocabulary for knowledge and media types. The second layer is cognitive maps for knowledge domains where typed links between topics are expressed. The third layer is cognitive content maps where learning content is related to cognitive maps. The fourth layer is a learning model ontology where automatically calculated didactic factors (like repeated calls of one knowledge object by a learner) are expressed. The fifth layer is a learner state ontology where the cognitive position of a learner is represented. Additionally, a ranking system to calculate the next recommendable knowledge objects and to calculate the selection of feedback messages has been developed. To ensure validity of the approach tests with real students were conducted using an INTUITEL mock-up in April 2014. The experiment was focused on real learners' reactions to the INTUITEL recommendations as received by means of an INTUITEL-enabled LMS. 19 students participated in a two phase testing procedure in order to analyze the learners' behaviour INTUITEL, the influence of the tutoring system, and the usefulness of the system in online learning courses as perceived by learners. Results show that students with INTUITEL follow more suitable learning pathways. Besides, the general satisfaction level of participants is increased. Most learners appreciate INTUITEL, would follow its recommendations and consider the messages shown by INTUITEL as useful and caring.

Main target groups of the project: content developers, eLearning providers

Significant public results: <http://intuitel.de/resources/>

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