

# Lecture Notes in Computer Science: Applied Pedagogical Ontology in Moodle for INTUITEL

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**Abstract.** In this contribution the authors want to share their experiences in applying and implementing didactical concepts in Learning Management Systems (LMSs), in this case, Moodle. Therefore the authors share their experiences and analysis when adapting the pedagogical ontology, designed and conceptualized in the EU-Project INTUITEL<sup>1</sup> and bring it together with prescribed set of elements in Moodle.

**Keywords:** pedagogical concepts, ontology, Moodle

## 1 Applied Pedagogical Ontology

In this demonstration, a prototype of the INTUITEL system will be presented with Moodle. The INTUITEL system provides an enhancement for existing LMSs. The enhancement adapts learning pathway recommendations and feedback messages to the needs and the behaviour of any learner. The adaptation takes place dynamically during the learning process. The prototype will be presented in a course with about 1000 learning objects and 12 learning pathways. The Pedagogical Ontology (PO) which is used in INTUITEL was developed in order to connect pedagogical expertise with technological data. Therefore, learning content, learning pathways and learning activities are structured and conceptualised with this ontology. Originally, the PO is based on the web-didactics concept of Norbert Meder ([1]) and used as a metadata system and metadata vocabulary as a basis for the PO which was implemented in OWL (Web Ontology Language). The structure of the PO consists of a three level hierarchy of Learning Object (LO) classes linked by containment relations. The first class is the Knowledge Domain (KD), which represents the course level. Each KD may

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contain one or more of Concept Containers (CC). Each CC represents one instructionally framed concept within a KD. Each CC is linked by typed relations to other learning objects as well as structured by the logic of pedagogical models within the pedagogical concept of the KD. These relations are assembled in Macro Level Pathways (chronologically forward/backward and hierarchically forward/backward). The third class Knowledge Object (KO) represents one atomic item of a certain knowledge. KOs are assembled corresponding to a structure of pedagogical relevance which is derived from pedagogical knowledge models or from media type models and called a Micro Learning Pathway. In our first application there are four different Micro Level Pathways (Good-Practice Multi Stage Learning (MSL), Simulation-Based Multi Stage Learning, Open Inquiry-Based Learning, and Structured Inquiry- Based Learning (IBL)). Two of them were used (Good-Practice MSL and Structured IBL) when applying the course to Moodle. The reason for that is the structural framework. MSL pathways follow a behaviouristic and teacher-centered approach whereas the two different IBL pathways follow an active and constructivist approach of learning [2]. On the one hand, this concept gives a consistent structure; on the other hand, exactly this consistency opens inconsistencies as playgrounds, which support the flexible structuring possibility in creating KDs ([3]). Consequently this structure allows a flexible way of creating KDs, because a variable re-use of Learning Objects and the adjustment of multiple linking in between is given.

The KD "General Didactics" was applied to Moodle and represents a five ETCS course of the University of Vienna. The course provides an overview of the history of didactics covered by twelve philosophers with each seven aspects. Hence (12x7) 84 CCs will be provided in four pathways (chronologically backward/forward and hierarchically forward/backward). In every CC, the KOs are assembled in an IBL or a MSL pathway. The KOs were implemented in text elements of Moodle with partly video/audio embedding. Assignment modules in Moodle allowed a fruitful connection to the PO. The philosophers are represented by CCs, and each topic of each philosopher as well. Therefore we used "Topics" in Moodle. With INTU-ITEL it will be possible to restructure the course, e.g. by seven aspects and not by the philosophers. The KD "General Didactics" was the course in Moodle itself with the appropriate title and description. Two pathways have been implemented (MSL and IBL) in the more teacher-centered version.

The PO and the applied content should be illustrated as a poster.

## References

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