



Adaptive Semantic and Social Web-based learning and assessment environment for the STEM

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We are building a cloud- and Semantic Web-based personalized, adaptive learning environment for the STEM fields that integrates and leverages Social Web technologies to allow instructors and authors of learning material to collaborate in semi-automatic development and update of their common domain and task ontologies and building their learning resources. The semi-automatic ontology learning and development minimize issues related to the design and maintenance of domain ontologies by knowledge engineers who do not have any knowledge of the domain. The social web component of the personal adaptive system will allow individual and group learners to interact with each other and discuss their own learning experience and understanding of course material, and resolve issues related to their class assignments. The adaptive system will be capable of representing key knowledge concepts in different ways and difficulty levels based on learners' differences, and lead to different understanding of the same STEM content by different learners. It will adapt specific pedagogical strategies to individual learners based on their characteristics, cognition, and preferences, allow authors to assemble remotely accessed learning material into courses, and provide facilities for instructors to assess (in real time) the perception of students of course material, monitor their progress in the learning process, and generate timely feedback based on their understanding or misconceptions. The system applies a set of ontologies that structure the learning process, with multiple user friendly Web interfaces. These include the learning ontology (models learning objects, educational resources, and learning goal); context ontology (supports adaptive strategy by detecting student situation), domain ontology (structures concepts and context), learner ontology (models student profile, preferences, and behavior), task ontologies, technological ontology (defines devices and places that surround the student), pedagogy ontology, and learner ontology (defines time constraint, comment, profile).