An Ontology to Model E-learning Tools, Events and Experts for their Use in Specific Contexts

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Abstract: With the popularization of online repositories and content management systems, digital resources available to organize educational activities proliferate. Digital resources include many different possibilities besides content, like events, people, or hardware devices and software applications. We propose a conceptualization of the educational domain by means of an ontology aimed to comprehensively classify educational resources. This ontology may serve as the foundation of complex knowledge-based systems to assist teachers in the categorization, selection and retrieval of the most suitable resources for any educational activity in any educational scenario they wish to design and implement.

Keywords: Educational resources, semantic modeling, ontologies, knowledge engineering

1. Introduction

In the context of information science, an ontology is a formal, explicit specification of a shared conceptualization (Gruber, 1995). Ontology construction is one of the tasks associated to semantic modeling, which in turn is aimed to collect the implicit knowledge about the domain (i.e., educational resources). The semantic model will serve as a terminological foundation to explicitly describe, in a way that software applications can process, all the information elements involved. In our case, an ontology for educational resources would provide a shared vocabulary to model the type of educational resources and associated concepts, their properties and relations. With it, we will describe, categorize and classify educational resources, and will provide support for smart tools and personalized services to assist teachers to select the best resources according to the activities they wish to implement.

Once the conceptualization is completed, it has to be encoded in a language for defining ontologies and semantic rules. This encoding is necessary to use the developed semantic model with existing inference engines. We have to encode the ontologic model using a Description Logic-based language (e.g. OWL (McGuinness & van Harmelen, 2004) and the knowledge captured through logic rules using a language supporting Horn-like rules (e.g. SWRL or RIF). In our case, Protégé (Knublauch et al., 2005) has been identified as the most convenient ontology construction tool due to its flexibility versatility, simplicity and availability. A complete version of the ontology in OWL is available at http://itec.det.uvigo.es/itec/ontology/itec.rdf, and an ontology navigator including descriptions of all entities can be accessed at http://itec.det.uvigo.es/itec/ontology/.

2. An Ontology for Educational Resources

We identified three fundamental information groups, namely people, events, and tools. Persons are considered as resources that can be utilized in a classroom to provide added value to the learning process. Besides the teacher, students may have available a rich pool of experts in several areas to provide advice and support. According to this new vision, where persons are also considered resources available to configure learning processes, people characterization goes beyond state-of-the-art people descriptions, and must include all skills, expertise and context about an individual (e.g. fluency in a given language, degree of knowledge of a particular subject, communication tools at his/her disposal, affiliation, etc.).
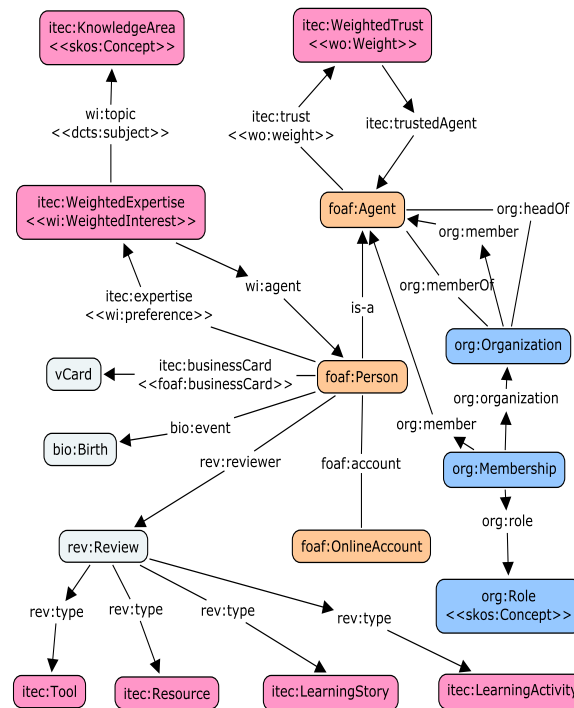
Figure 1. Excerpt of People Conceptualization.

Events should also be considered as relevant resources for the planning of learning activities in any comprehensive conceptualization of educational resources,. An event is a planned activity where participants from several organizations discuss ideas. Workshops, seminars, conferences and virtual meetings are examples of events that may support novel learning activities to improve the educational practice in schools. Event conceptualization should be targeted to model the most relevant features of events, like the type of participants, venue, relevant dates, audience, or specific tools needed to participate.
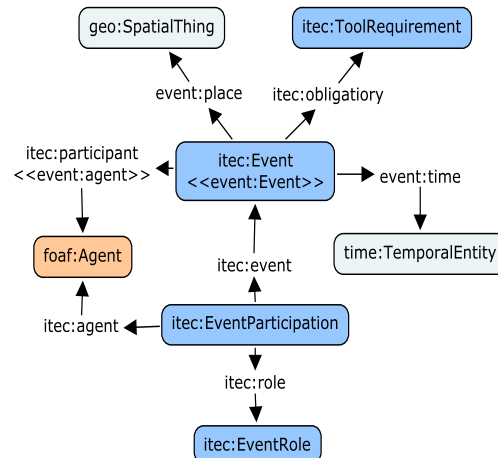

Figure 2. Excerpt of Event Conceptualization.

A key aspect of the actual implementation of learning activities is their technical feasibility, that is, to find out whether a learning activity can be performed in a given school taking into account its functional requirements and the hardware and software tools available there. Thus, the ontology should characterize the set of technological tools available in a school, that is, its technical setting, together with the distinct features of these tools (e.g. technical specifications, functionalities, supported languages, etc.).
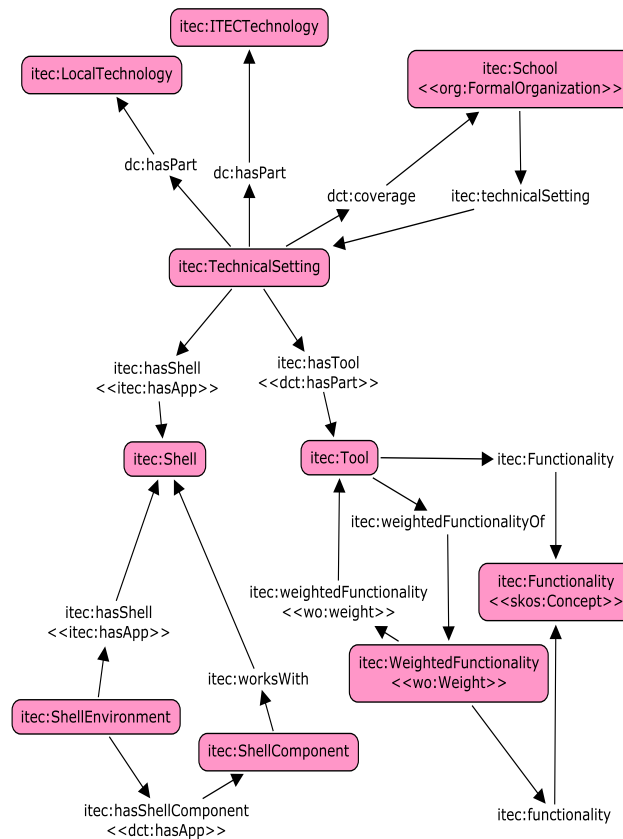
Figure 3. Excerpt of Tool Conceptualization.

3. Conclusion

Experts confirmed that most of the ontology does collect concepts and relations from the real word, providing a positive evaluation. However, some elements were identified that were deemed unnecessary for most real world educational scenarios. Several elements (*Trust*, *Expertise*, and the related measurement factors *WeightedTrust* and *WeightedExpertise*) were identified as candidates for removal because they were not considered as relevant. Besides, the data needed for these elements is hard to obtain. Finally, some experts posed some questions on the actual source of some of these pieces of information. Anyway, they were very specific issues that will be assessed once first tests with final users and real working scenarios take place.

Acknowledgements

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