USING ONTOLOGICAL APPROACH IN ORGANIZING PEDAGOGICAL PROCESSES

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Abstract. The article analyzes classical ontologies of pedagogical processes. The history of the development of the pedagogical process and ontological approach is described. Using the example of a flipped classroom, the method of using the ontological-logical approach in organizing learning is considered. The necessary resources and requirements for using the inverse class method are studied. Provides information about video lessons, content and feedback platforms that are part of online learning.

INTRODUCTION

In the ontological approach of the classical pedagogical process, the student is not considered as an active participant in this process. In the classical approach, a "person" is viewed as an object opposed to a purposeful and consistent pedagogical process. In pedagogical dictionary you can read the following: as an object of pedagogical influence - in the classical educational paradigm, a person who follows the teacher's instructions takes the position of a "respondent", sets his own goal in the educational process and achieves. He is seen as a student who does not have real opportunities for implementation (listening to a lecture, completing a task, solving a problem, etc.). Currently, the contribution of information technologies in the development and improvement of the field of education in the world is growing. Internet, computer and communication technologies are widely used in organizing the educational process. A separate approach is being developed for each taught subject. This article talks about the use of ontologies (ontological approach) in the organization of educational processes. In the paradigm of classical learning processes, learning occurs by limiting the learner's ability to think independently. Back at the end of the 19th century, the main task of the teacher was to limit the student's independent thinking and teach him the knowledge that was considered correct for the generation preceding the student. Let us cite the opinion of the German scientist Johann Friedrich Herbart (1776-1841), one of the founders of scientific pedagogy: "The student's ability to think independently must be limited in such a way that he becomes a receptacle for knowledge that the teacher considers true."

LITERATURE REVIEW

The ontological approach to the processes and systems of training and education in the scientific article is presented as follows: An analysis of modern trends in the development of forms of knowledge representation in training and education systems was carried out; It is shown that the ontological approach is a means of adapting the education system to the growth of knowledge volumes and the urgent need for their structuring and formalization. The results and directions of development of ontologies in education systems and technology for developing ontologies are determined [1].

Ontologies in educational process management in a scientific article tells us the following: in educational processes of universities, the ontological approach is used in the management of educational programs, to describe

the subject areas of academic discipline programs, and to assess students' knowledge. The article discusses the ways of using ontologies in teaching and provides an example of an ontological approach in managing the educational process [2].

METHODOLOGY

Nowadays, ontologies are structured in almost the same way regardless of the language in which they are written. They consist of objects, concepts (classes), attributes and relationships. Instances or individuals are objects, which are mainly considered as low-level components of the ontology, divided into such types as physical objects (people, houses, planets) and abstract ones (numbers, words). More specifically, an ontology can be implemented without objects, but since one of the main purposes of an ontology is to classify such objects, they are also considered one of the components of the ontology. Concepts or classes are abstract groups, collections, or sets of objects. They can contain objects, other classes, or a combination of both.

For example:

- The concept of "*Person*" lies within the concept of "*Man*", whether "*Person*" is considered a concept, class or object depends on the structure of the ontology.
- "*People*" is a concept, "*man*" is an object.

Ontology classes form a taxonomy—a hierarchy of concepts about applications. Attributes - objects in the ontology can have attributes. Each attribute must have at least a name and a value. Attributes are used to store information specific to and associated with an object.

For example, a science object named N contains the following attributes:

- Name: N science
- Number of topics: 40
- Volume of independent work: (30 hours in the classroom, 70 hours outside the classroom)
- Type of controls: 3

An attribute value can contain complex data. In this example, the value of the attribute named "Independent workload" is a list of simple data types. Attributes are divided into the following types:

- Simple and complex
- Primary and secondary
- Mandatory and non-mandatory
- Single and multi-valued

Relationship - an important role of attributes is to define relationships (dependencies) between ontology objects. A relationship is usually an attribute whose value is another object. Let's assume that there are two objects - Topic_A and Topic_B topics in the ontology of information systems design related to informatics. Let Topic_B be the successor topic of Topic_A, and the relationship between topics Topic_A and Topic_B is defined by the value of topic "Topic_A" as the "isSuccessorOf" attribute for the Topic_B object (it should be noted that there are predefined inheritance relationships in ontology-describing languages). Here isSuccessorOf is called the relation between Topic_A and Topic_B topics.

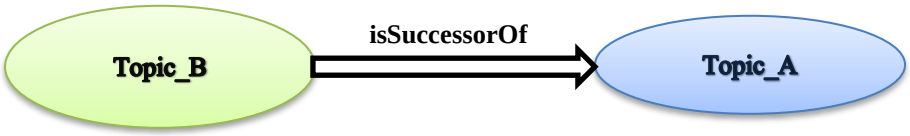

FIGURE 1. Ontology between topics.

This relationship can be depicted in the form of a visual block diagram in Fig. 1. Specific (special, specialized, subject-oriented) ontologies are the representation of a domain of knowledge or part of the real world. Such an ontology contains domain-specific meanings of terms. For example, in the science of designing information systems, the word "computer" means hardware, in physics it means one of the types of matter, in mathematics it means a class of algebraic systems. Generic ontologies are used to represent concepts that are common to a large number of domains. Such ontologies include a thesaurus, a dictionary, and a set of terms used to describe scientific terms. If a system develops that uses proprietary ontologies, it may be necessary to merge them. A secondary task of ontology

integration is the task of describing ontologies. For an ontology engineer, this is a serious task. Ontologies of related sciences may not be compatible with each other. The difference may arise due to local culture, idiosyncrasies of ideology, or the use of other descriptive language. Ontologies are merged by an engineer or semi-automatically. In general, this is a laborious, slow and expensive process. Using a basic (single dictionary) ontology makes this a bit easier. In order to use ontologies in the field of education, it is necessary to distinguish the main objects. Because the logic to be built depends on the mutual relations, properties and attributes of these objects. For learning resources, this is "course" and "lesson". But in reality, the number of objects will be large. In the information systems design training course, distinguish between "direction", "test", "code review", "quiz", "participant", "project" can be shown. The application of ontologies in the field of education provides an easy, high-quality, and time-efficient way to describe and describe the information and concepts provided to students. In this case, the information, concepts and knowledge given to the student are not presented in an abstract form, but in a realistic form. We use the ER (ERD) model, UML diagrams, to represent knowledge in this way.

The ontological logic approach can be used in education as follows:

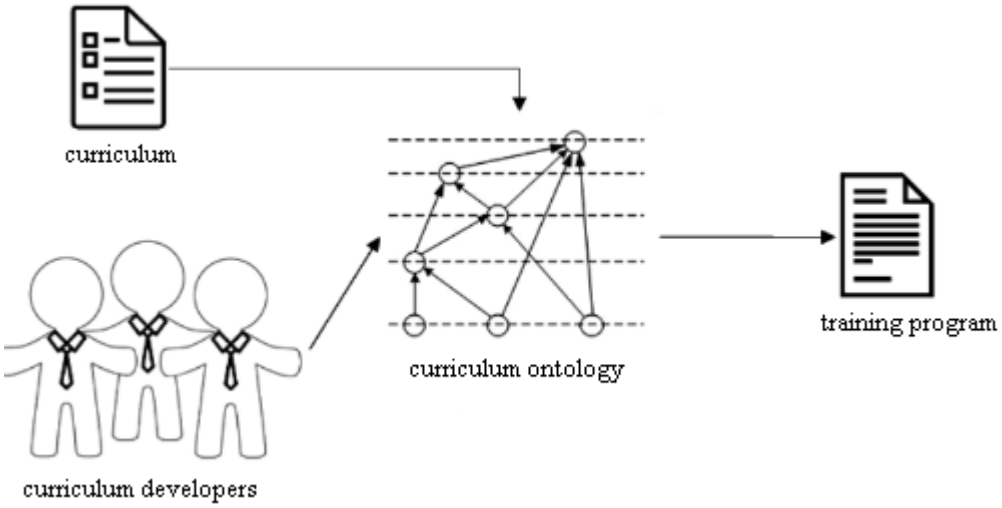

FIGURE 2. Science program management using an ontological approach.

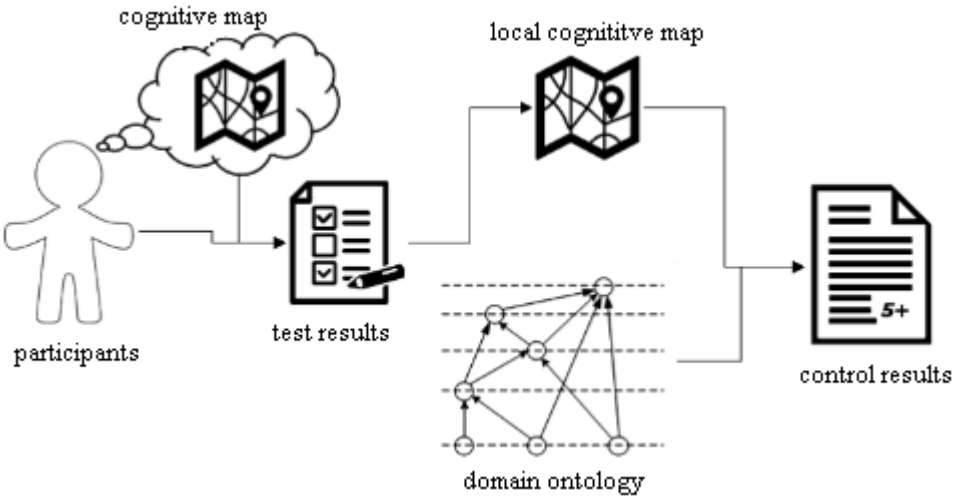

FIGURE 3. The scheme for determining the student's level of knowledge.

When education is organized using an ontological approach as Fig. 3, the quality of the ontology is determined by an expert. If the ontology has the necessary quality indicators, the expert considers it to be passed to the next stage, otherwise, the ontology is redeveloped or a certain part is changed as Fig. 4.

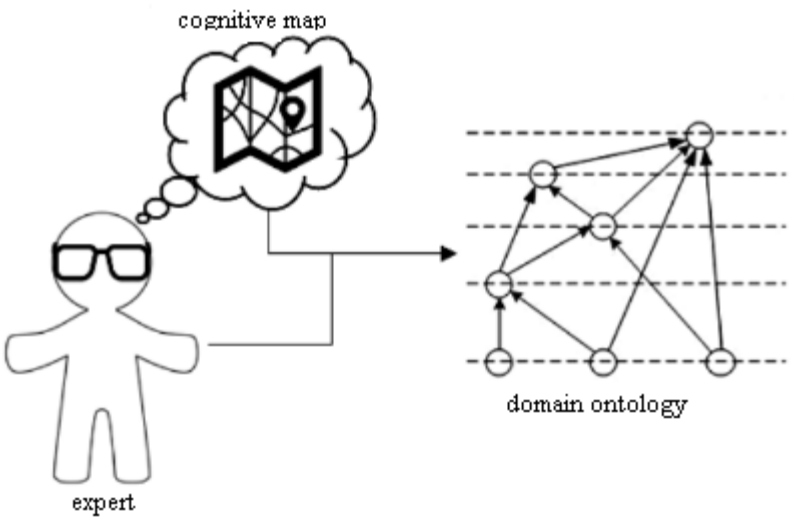

Figure 4. Ontology review by an expert.

The author proposes to automate the process of creating a textbook ontology. Creating an ontology manually is labor-intensive and not economically feasible for textbook evaluation.

CONCLUSION

The use of an ontological approach in the teaching of any subject allows for a detailed description and analysis of relations in the educational process with the help of diagrams in the organization of courses, clubs and classes, and the construction of relationships between the subject teacher, students and tutors. Conceptual schemes of relationships built in the educational process with the help of ontologies will fully demonstrate this process and contribute to the improvement of science teaching.

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