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The Functional Model Construction of a "Problem-oriented-distributed" Learning System

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Abstract: The traditional teaching mode of knowledge teaching ignores students' recognition of 'conditional situation of knowledge', and students acquire non-conditional knowledge. The application of "problem-oriented-distributed" learning mode is conducive to students' mastery of "conditional situation of knowledge," so as to better acquire conditional knowledge, and promote students' ability to identify, analyze and solve problems through tools and extensive collaboration. The functional model of the 'problem-oriented-distributed' learning system reveals its interrelated functional modules, which is helpful for the optimal design of the actual system and the best function of the system, and provides a basis for the development of the 'problem-oriented-distributed' learning system software.

Keywords: problem-oriented-distributed, learning system, functional model

Introduction

In the information society, people face massive amounts of information every day, but they lack the ability to effectively judge and select information. Therefore, it is urgent to cultivate students' ability to effectively judge and select information. However, the reflection of school teaching practice ignores the training of students in this regard, especially in the teaching of knowledge acquisition, which deprives students of the opportunity to identify and analyze specific situations, so that students lack the ability to make accurate judgments and effectively select information in the face of task situations.

1. Analysis of the lack of 'knowledge conditional situation' recognition

The conditional context of knowledge refers to the context of knowledge generation and application, and context is the condition of knowledge generation and application. The research on expert knowledge shows that expert knowledge contains a specific description of the context of knowledge application, so experts can easily extract relevant subset knowledge to solve specific problems, that is, expert knowledge is 'conditional', reflecting the conditional context of knowledge generation and application[1]. Unconditional knowledge is 'inert' knowledge that is difficult to activate in the face of specific problem situations. Owners do not know the conditions and scope of its use. For example, in school teaching, knowledge transfer allows students to master unconditional knowledge[2].

In the teaching mode of knowledge teaching, the relevant problem situation is presented after the students have learned the knowledge. Students do not need to judge and choose, and can solve the problem by using the concepts and rules just remembered. On the surface, students learn to use the knowledge they have just learned. In fact, students lack the recognition of knowledge application scenarios, that is, knowledge conditional situations, and master 'inert' knowledge.

2. The demonstration of learning mode to identify 'knowledge conditional situation'

In order to make up for the lack of recognition of 'knowledge conditioned situation' in school teaching, an effective method is to adopt problem-based learning. Problem-based learning refers to the use of problems to drive students to learn, that is, students ask questions before learning new knowledge. The presentation of questions is convenient for students to identify the conditional situation of knowledge generation and find new knowledge needed to solve problems. When students face problems, identifying problems, analyzing problems and solving problems are inseparable from the use of tools and collaboration with other partners. In order to achieve mutual consultation and in-depth communication between collaborative elements (including people and tools, smart devices) within the maximum scope, it is necessary to share information between elements within the system. Each element has information resources and specific functions that are different from other elements - that is, distributed storage of learning resources and division of labor to process learning tasks. Therefore, problem-based learning is 'distributed'. The word ' distributed' is used to describe the two major functions of computer networks: distributed storage data and distributed processing data. Similarly, distributed learning means integrating learning resources distributed in different time and space, realizing resource sharing and completing learning tasks through extensive collaboration.

Learning needs problem-driven, and problem-solving is the process of sharing distributed learning resources and processing learning tasks. Problem-oriented-distributed are the attributes of learning in the information age.

3. Function model Construction of 'problem-oriented-distributed' learning system

The model is the abstraction of the actual system. The functional model describes the overall function of the system and decomposes it into interrelated functional modules. The emergence of the overall function of the system is achieved through the collaborative efforts of various functional modules within the system. The functional model of the 'problem-oriented-distributed' learning system is mainly composed of the following nine modules.

3.1 Pre-analysis

It mainly includes learner analysis, learning needs analysis and learning resources analysis. Learner analysis is a diagnostic evaluation of students' current cognitive style, thinking characteristics and knowledge level. The analysis of learning needs is to determine the gap between the current level of knowledge and ability of students and the level of knowledge and ability achieved after learning; the analysis of learning resources is aimed at students' learning. It classifies and counts the information inside and outside the school and on Internet, and understands and analyzes various factors that affect students' learning.

3.2 Objective determination

To determine the teaching objectives suitable for social development requirements and individual psychological characteristics on the basis of previous analysis. Bloom divides the goals of the cognitive field into six levels: memorization, understanding, application, analysis, synthesis and evaluation. Simpson et al. divided the goals in the field of motor skills into seven levels: perception, preparation, guided response, mechanical action, complex explicit response, adaptation, and innovation. Krausswood et al. divided the goals of the affective domain into five levels: acceptance or attention, response, evaluation, organization, and the characterization of values and value systems[3]. The above classification of objectives provides a basis for the formulation, implementation and refinement of teaching objectives.

3.3 Content analysis

To select the corresponding teaching content according to the determined teaching objectives, and stipulate the type, scope and depth of the teaching content, reveal the relationship between the relevant content, and initially present the content and its logical relationship in the form of questions. Gagne classified the learning results and put forward five kinds of learning results: verbal information, intelligence skills, cognitive strategies, motor skills and attitudes, and divided intelligence skills from simple to complex, from low to high level into discrimination, concepts, rules, advanced rules and so on[4]. Gagne's classification of learning results provides the basis for the selection and refinement of teaching content.

3.4 Problem situation setting

According to the teaching objectives and teaching content, design framework problems, and prepare relevant information resources and tools, design problem situations including learners, tools, smart devices, learning partners, teachers, parents, remote experts, etc.

3.5 Problem identification

Teachers introduce students into the problem situation. With the help of teachers, students independently discover problems by observing and thinking, identify the scope and type of problems, and use tools to detect the nature of problems in detail, and communicate with other facilitators. Views on the problem determine the old knowledge that needs to be reviewed and the new knowledge that needs to be discovered.

3.6 Information search

It mainly refers to the use of information search tools to obtain relevant information resources, students can obtain knowledge content through interviews with relevant experts, and can also obtain rich and colorful resources from Internet. From the perspective of supporting students' learning, information resources can be divided into six categories: acquisition, guidance, communication, cooperation, inquiry and expression[5].

3.7 Knowledge representation

It refers to the knowledge formed after information processing, which is clearly expressed by various knowledge representation tools (such as concept maps, opinion maps, etc.) and methods. Through mutual sharing, communication and discussion, a consensus on the problem is formed, and the strategy and plan for problem solving are initially established.

3.8 Problem solving

It refers to the formation of problem-solving strategies and solutions on the basis of extensive communication within and between groups, and the implementation of solutions to solve corresponding problems. The solution to the problem includes the application of old knowledge and the new knowledge obtained by students through information search.

3.9 Evaluation

It can be divided into teacher evaluation and student self-evaluation. The purpose of evaluation is not to locate students, but to promote the development of students, so that students can understand the problem more comprehensively and realize their own limitations. According to the different stages of evaluation, evaluation can be divided into diagnostic evaluation, formative evaluation and summative evaluation.

4. Conclusion

'Problem-oriented-distributed' learning is proposed in view of the increasingly obvious disadvantages of knowledge teaching in the information society (students do not recognize the conditional situation of knowledge and directly obtain 'inert' knowledge). The functional model of the 'problem-oriented-distributed' learning system reveals its various functional modules for system design and software development. However, how to construct the 'problem-oriented-distributed' learning process model, give detailed guidance to teaching activities and teaching events in the specific teaching implementation process, and reveal the specific strategies of element interaction and collaboration in the system, these are the contents of further research.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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