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EXPERTS' VIEWS CONSIDERATION IN ASSESSING OF THE LEVEL OF STUDENTS' KNOWLEDGE IN DISTANCE LEARNING

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Abstract. The paper describes the model of choice of courses, which takes into account the level of knowledge of students in distance education, in order to select the optimal training plan. Discusses the importance of the use of expert judgments in terms of distance learning. Considered an adaptive approach to the selection of a training plan based on expert opinions and took into account the analysis of the level of knowledge of students, using the aggregation operator OWA.

Keywords: distance learning; study plan; information systems; expert judgments.

1. INTRODUCTION

In modern society, the processes of change in the education system associated with the introduction of new educational technologies. Along with the traditional education system a new form of learning (distance learning) successfully developed. Internet, information and communication technologies are widely used in distance learning, but at the same time educational technology, methods, forms and means of traditional education are also maintained.

At the same time, the rapid development of information technologies involves human continuous training and getting new skills. In this regard, distance education corresponds to the modern realities of life, ensuring the delivery of the big volume of studied materials and providing interactive communication of students and teachers in the learning process.

The learning process is based on the interaction between teaching and learning. The learning process is always a two-way, its structure always contains two elements: activities of teacher (teaching) and student activities (learning). In addition, all educational activities has a subject and aimed at mastering a certain reality, it follows that the third element – the facts, phenomena, concepts, values, laws, and theories. During the learning process the interaction and correlation between three elements are outlined.

Distance learning is a set of technologies for delivering the main volume of studied material to the student, interactive communication between students and teachers in the learning process, providing training opportunities for the development of independent study, as well as in the learning process. Distance learning involves the lack of direct communication between the student and the teacher, which is sometimes not only technical, but also a serious psychological barrier even with the use of modern means of communication, video conferencing, etc. Hence there is the lack of personal contact between the teacher and the student [1].

In the context of the specifics of teaching is quite clear that the competence of the teacher through personal contact is higher than in distance learning. In terms of personal contact there is a clear representation of the profile and the type of student's personality, as well as the skills and knowledge he possesses. From this it follows that in conditions of remote interaction there is a need in expert judgment that will allow determining the level of students' knowledge through questionnaires and testing and choosing an individual learning plan.

A significant factor in improving the quality of distance education is the use of mathematical methods and models in the preparation of solutions. However, a complete mathematical formulation of this problem is often not feasible due to its novelty and complexity. In this regard, are increasingly being used expert methods, which are understood complex logical and mathematical-statistical methods and procedures to obtain information from the experts needed for the preparation and selection of rational decisions.

2. EXPERTS' VIEWS CONSIDERATION IN ASSESSING OF THE LEVEL OF KNOWLEDGE

Expert methods now used in situations where the selection, justification and evaluation of the consequences of decisions cannot be made on the basis of accurate calculations. Such situations often arise in the development of modern problems of social production and management, particularly in forecasting and long-term planning. In recent years, expert assessments are widely used in the socio-political, scientific and technological forecasting, planning of the economy, industries, in the development of major scientific and technical, economic and social programs, in solving specific problems of management. [2] In this paper we consider the problem of the use of expert methods in distance learning.

Expert evaluation is the procedure for obtaining estimates of the problems based on the opinions of specialists (experts) for the subsequent decision (choice). Experts (from the Latin "expertus" – experienced) – are persons who are knowledgeable and able to make a reasoned opinion on the studied phenomenon. Methods of expert assessments are the methods of work organization with experts and processing of expert opinions. The essence of the methods of expert assessments is that in the basis of the forecast laid expert or a team of experts opinion, based on the professional, scientific and practical experience.

Expert evaluations are a set of logical and mathematical procedures to obtain information from experts, its analysis and synthesis for the preparation and development of rational decisions. Methods of expert assessments can be divided into two types: methods of collective work of the expert group and the methods for obtaining individual opinions of members of the expert group. Methods of the teamwork of the expert group suggested getting consensus in a joint problem under discussion. Sometimes these methods are called direct methods to obtain collective opinions. The main advantage of these methods is the ability to comprehensive analysis of problems. The disadvantage is the complexity of the procedure for obtaining the information, the complexity of the formation of group opinion on individual judgments of experts, the opportunity to pressure the authorities in the group.

Consider the process of coordination of expert opinions. Each criterion, on which there is agreement, must be rank, as well as weights for each expert should be defined.

Suppose that the vector contains the ratings of experts:

$$R^k = (r_1^k, r_2^k, \ldots, r_N^k), \quad (1)$$

where $k = \overline{1,\ldots,K}$ is the number of experts and N is the number of criteria for ranking students. In (1) r_i^k is a rating of the k-th expert for the i-th criterion.

Denote $R^k = (r_1^k, r_2^k, \ldots, r_N^k)$, as a combined group rating.

Assume that the relative importance of the experts determined by introduction of the weight vector $w = (w_1, \ldots, w_K)$ with $w_k \geq 0$, where $k = \overline{1,\ldots,K}$ and $\sum_{k=1}^{K} w_k = 1$, introduce the following group distances function based on aggregation operator OWA:

$$D_{owa}(R^1, \ldots, R^K) = \sum_{k=1}^{K} w_k d(R^{\pi(k)}, R^G), \quad (2)$$

where $d(R^{\pi(k)}, R^G) \geq d(R^{\pi(k+1)}, R^G)$, $k = \overline{1,\ldots,K}$.

The main characteristic of OWA-operator is that it allocates the weight in accordance with the input values, thus emphasizing the highest, lowest and average level of individual differences (distances). Thus, the problem of finding a group opinion is solved, and this opinion minimizes the distance between people. [3]

Problem can be represented in the following optimization model:

$$\mathrm{Min}\, D_{owa}(R^1, \ldots, R^K), \text{ where } k = \overline{1,\ldots,K}. \quad (3)$$

In order to find a compromise solution assume that the metric d is the Kendall coefficient of rank correlation and cannot exceed a predetermined threshold. [4, 5]. Thus, the model becomes:

$$\mathrm{Min}_{R^k} \sum_{k=1}^{K} w_k \sum_{i=1}^{N} \left| r_i^{\pi(k)} - r_i^G \right| \quad (4)$$

on the assumption of $\sum_{i=1}^{N} \left| r_i^{\pi(k)} - r_i^G \right| \leq \tau_k$, where $k = \overline{1,\ldots,K}$.

Thus, we have a model that minimizes the deviation of expert opinions on the generalized average rating.

3. CONCLUSIONS

Distance education is becoming more common throughout the world. Its strategic goal is to provide access to quality education in a student place of living or work. More about the application of information technology in education can look in [5, 6].

Using the method of expert estimations helps to formalize procedures for the collection, compilation and analysis of expert opinions to convert them into a most convenient form to make a reasonable decision. But it should be noted that the method of expert evaluations cannot replace any administrative or planning decisions, it only allows replenishing the information necessary for the preparation and adoption of such decisions. Widespread use of expert assessments is valid only when the analysis of the future with more accurate methods cannot be applied.

Consideration of the views of experts in terms of distance learning can solve the problem of lack of personal contact. Using of this model allows to calculate an assessment of the level of knowledge of students for distance education, taking into account the opinions of experts, this helps to choose the optimal training plan to the student which would better suits his professional and educational needs, as well as abilities.

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МЕТАДАННЫЕ

Название: Учет мнений экспертов при оценке уровня знаний студентов дистанционного обучения.

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Аннотация: Описывается модель выбора курсов, которая принимает во внимание уровень знаний студентов в дистанционном обучении, с целью подбора оптимального плана обучения. Рассматривается важность применения экспертных оценок в условиях дистанционного обучения. Рассматривается адаптивный подход к выбору плана обучения с учётом мнения экспертов, основанный на анализе уровня знаний студентов, с применением оператора агрегации OWA.

Кючевые слова: дистанционное обучение; учебный план; информационные системы; экспертные оценки.

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