Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research, 2014, 6(5):632-635

Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

An evaluation index system of computer education quality based on analytic hierarchy process model

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ABSTRACT

In today's competitive educational environment, the quality of computer education is ever more recognized as a fundamental factor in gaining competitive advantage. The evaluation and improvement of the quality of computer education in higher education is an important issue of on-going concern. The aim of this article is to focus on an automated management and evaluation system to efficiently control the administration of computer education. Reported in this article is an evaluation index of the quality of undergraduate education, and an analytic hierarchy process (AHP) model that is both practical and has proven to be successful. The results of the presented case study demonstrate the practicability and effectiveness of this model in physical education quality evaluation.

Keywords: physical education; evaluation system; AHP

INTRODUCTION

In today's highly competitive marketplace, college students demand that education be of high quality, of reasonable cost, and with good support services. The evaluation of computer education quality has become a feature of the higher education landscape [1]. On the one hand, physical education quality assessments are being carried out by the new national funding bodies in response to the needs of society in the present age. On the other hand, the major stakeholders in higher education increasingly want to be assured of the quality of computer education.

In fact, the evaluation of education quality can be planned and implemented by small, independent task groups. Heads of schools and evaluation departments have been encouraged to monitor the operation of their evaluation assessment schemes in order to improve educational quality. Much experience in the higher education system has led to the conclusion that high quality is one of the keys to improve physical education [5].

The content of this article touches upon the construction of an evaluation index system for physical education quality. No attempt has been made to establish an absolute evaluation index system, because it is felt this would be not only impractical but also restrictive [6]. The present quality assessment systems for physical education can be conveniently used in developing a new system. The first step was to set up an evaluation index system involving the formal appraisal of staff performance and the effectiveness of the education process. The second step was to set up a more effective evaluation model based on the analytic hierarchy process (AHP) method. The evaluation index system for computer education quality is extremely varied.

After the literature review, the author introduces a new model for administrative management to strengthen the existing evaluation index system. In this article, the author attempts to provide a finished model for physical education evaluation by using the AHP method. There are different qualitative and quantitative indicators for computer education quality. The aim of this study is to provide a tool to facilitate this. The effective assessment of

the quality of computer education is one of the keys for education administrators in implementing university education.

Research discussed in this article is logically ordered into various sections. First, the evaluation index system for computer education quality based on the AHP method is presented. In the next section, the application of this evaluation index system is explained through a case study. Finally, conclusions are drawn.

EVALUATION INDEX SYSTEM FOR PHYSICAL EDUCATION QUALITY

In such a diverse environment, there are a number of methods that can be applied. In the study outlined in this article, an evaluation index system of computer education quality, based on an analytic hierarchy process model, was applied. A novel model is presented in this article for a college evaluation index system for computer education quality. The proposed model and its evaluation index system would enable a computer education quality evaluation.

THE AHP METHOD

The analytic hierarchy process or AHP method, which was established in 1977, is a popular way to solve multiple criteria decision problems. The AHP method provides a comprehensive structure by which to combine both quantitative and qualitative criteria in the decision-making process. Practice has proven that the method is easy, comprehensive and logical. Based on AHP, the factors involved in undergraduate education can be varied and a unified evaluation index system can be created.

In the AHP method, the problem is structured hierarchically in different levels. Any complex problem can be decomposed into several sub-problems using AHP, and hierarchical levels, where each level represents a set of criteria relative to each sub-problem. As AHP is a very powerful method by which to solve complex decision problems, it was selected as the major tool in this study. Next, the simulation methods are described in detail.

The AHP method is based on the use of pair-wise comparisons, which lead to the elaboration of a ratio scale. In the AHP method, multiplicative preference relations are called judgment matrices, and are adopted to express the decision makers' preferences. The pair-wise comparisons constitute square matrices, as shown in the matrix (1), the values of which are between 1/9 and 9.

$$b = \begin{bmatrix} -\frac{1}{2}(X^{(1)}(1) + X^{(1)}(2)) \\ -\frac{1}{2}(X^{(1)}(2) + X^{(1)}(3)) \\ \cdots\cdots \\ -\frac{1}{2}(X^{(1)}(n-1) + X^{(1)}(n)) \end{bmatrix} \tag{1}$$

$$X^{(0)} = \left\{X^{(0)}(i), i = 1,2,\ldots,n\right\} \tag{1}$$

$$X^{(1)} = \left\{X^{(1)}(1), X^{(1)}(2), X^{(1)}(3),\ldots X^{(1)}(n)\right\},$$

$$X^{(1)} = \left\{X^{(1)}(k), k = 1,2,\ldots,n\right\} \tag{2}$$

$$X^{(1)}(k) = \sum_{i=1}^{k} X^{(0)}(i) = X^{(1)}(k-1) + X^{(0)}(k)$$

$$X^{(1)} = \left\{X^{(1)}(k), k = 1,2,\ldots,n\right\}$$

As mentioned before, in this study, the AHP method was applied to evaluate the quality of physical education. The AHP method searches and evaluates the cause and effect relationship between a goal and alternatives by breaking down the structure of the problem. Finally, the AHP method was used to measure education quality by utilizing the evaluation index system.

PROPOSED EVALUATION INDEX SYSTEM BASED ON THE AHP METHOD

As the pace of market globalization quickens, the number of potential evaluation indices of computer education quality assessment increases; and the aim of this study was to develop an evaluation index system of computer education quality that would be effective and efficient. A large attribute set has been reduced and transformed into a lesser number of sub-targets to facilitate the evaluation of education quality.

This study introduced the AHP method to establish an integrated evaluation model. The computer quality education problem involves analyzing and measuring the performance of a set of candidate indicators.

CASE STUDY OF PHYSICAL EDUCATION QUALITY EVALUATION

During the case study, the AHP method was applied to solve the problem of physical education quality evaluation. The proposed evaluation index was used by an independent college in China's Hubei province. The staff implemented a physical evaluation in their departments as part of a quality assurance process. It included a total of 17 criteria, divided into five cognate groups covering all the basic aspects of the college course. The evaluation index system of computer education quality is shown in Figure 1. The criteria were based on the overall aims and objectives of the computer course.

In the study, the AHP method was applied to screen indexes and the weight coefficients were defined. According to the proposed model, the estimation of an evaluation index system of computer education quality involves the following phases. First, an investigation was carried out of current physical education quality. Second, an analysis was made of the legitimacy of the evaluation index system. Third, the evaluation process was transformed into concrete operational procedures and standards. At the same time, the evaluation indexes to evaluate physical education quality were selected. However, when the data are collected, it will be necessary for respondents to determine the complicated network of the state-education relationships.

Thus, it was found that these proposals are not only very effective in helping AHP decision makers to reach consensus, but they also provide convincing alternatives for computer education quality. Based on the findings from the preceding literature reviews, an AHP model was formulated to evaluate computer education quality, as shown in Table 1, the models of AHP were studied, and the AHP algorithm was analyzed. Then, the AHP method was used to determine the weights of the evaluation index system for computer education quality. The basic information with respect to index weights is shown in Table 1.

Tab.1 Evaluation index system and index weights

First class index		Second class index	
Index name	Index weights	Index name	Index weights
A: Talent development	0.285	A_1: Course content	0.137
		A_2: Course proportion	0.284
		A_3: Course construction	0.193
		A_4: Textbook compilation	0.386
B: Teaching methods	0.207	B_1: Teaching approach	0.364
		B_2: Teaching means	0.245
		B_3: Teaching technique	0.391
C: Teaching staff	0.116	C_1: Construction and training	0.216
		C_2: Full-time teacher	0.183
		C_3: Scientific research	0.327
		C_4: Practical education	0.274

CONCLUSION

The overall purpose of this article was to explore and contribute to an evaluative process for computer education quality. Automated evaluation makes the difficult task of evaluating computer education quality, simple and easy. The feedback received from the various institutions indicated that the evaluation index system has proved successful in achieving its various aims.

The evaluation results also provided a great deal of useful information about the effectiveness of the approved AHP model used in the education quality assessment process. At the same time, this work should prove its value as an empirical reference for other evaluation index systems for computer education quality for other nations or states. It is also hoped that it will be of interest to colleagues, and the author would be pleased to provide further information

about the evaluation of physical education quality.

Acknowledgments
We thank financial Supported by education and reformation key program of graduated students of Educational Commission of Guizhou Province in China (Project No. JG [2013]017)

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