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Effect of the improvement of the quantitative evaluation model of teaching material on the development of mathematics courses in university

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ABSTRACT

As the important basis for selection of university public mathematics curriculum materials, the establishment of the materials quality evaluation system can ensure the continuous improvement of teaching quality, the choice of teaching materials can have a positive impact to development of courses teaching, which can conducive to the overall development of a public university mathematics courses. The scientific establishment of the materials quantitative evaluation model can take a scientific assessment for teaching secondary and overall objectives form fundamental. The establishment of quality evaluation system can provide an effective basis for the process of teaching quality evaluation model, which can make the establishment of quality evaluation model has a relatively strong layering. Making the in-depth exploration of materials evaluation index system by analytic hierarchy process, the processes of "scientific" and "reasonableness" of quality evaluation model can continuously improve, which can provide strong theoretical support for the practical application of the model.

KEYWORDS

Quantitative evaluation model; Scientific construct; College teaching materials; Mathematical public courses; Scientific application.

INTRODUCTION

The "selective" of public university mathematics curriculum materials was more widely, from the perspective of curriculum development, mathematics curriculum materials selection should be based on common curriculum development "targeted" as the starting point. Making the scientific quantitative comparison and evaluation of teaching materials selection can ensure the adapted value of the teaching materials continues to increase. From the direction of the reform and development of higher education, the construct of public universities mathematics curriculum system should be combined with students' own characteristics, the selection of the teaching materials should have a corresponding "flexibility" and "applicability" to improve the efficiency of public mathematics teaching.

However, the construct and perfect of teaching materials quantitative evaluation model has a crucial role on this basis, making the overall quantitative comparison from the quality of teaching materials. According to the teaching policy and curriculum requirements of higher education, the scientific comparison of basic principles of educational evaluation and quantitative techniques in teaching materials selection process can provide effective evaluation criteria for the "scientific" of the selection of college mathematics public teaching materials. This is one of the important aspects of scientific construct of university mathematics public teaching system, which can provide effective protection for the continually improvement of the "targeted" of the selection of teaching materials[1]. The writing of the colleges mathematics public curriculum materials have been showing a "contending" posture, scientific construct of quantitative evaluation model can give a further clear to some extent for the fundamental needs direction of materials, which can meet different public university mathematics curriculum development needs, and then reach the ultimate goal that provide a strong basis for the development of university mathematics courses.

SCIENTIFIC CONSTRUCT OF EVALUATION INDEX SYSTEM OF UNIVERSITY MATHEMATICS TEACHING MATERIALS

In the construct process of the college mathematics teaching materials evaluation model, the construct process of evaluation index system can generates a vital role, the main content of quality evaluation of the mathematics teaching materials should cover the following aspects. First is the overall quality of teaching materials, the overall quality of teaching materials mainly covers the targeted of the content, summarization of the relevant theoretical knowledge and the training of knowledge and ability, which is a concentrated expression of the overall quality. The second is the scientific planning for the evaluation of secondary objective, identified mainly for scientific level, teaching level, architectural level, features fun level, the level of figures and writing. The scientific level mainly refers thein-depth exploration of the "scientific" of the content of the teaching materials, while taking the developed index for positive impact of the college mathematics public teaching, which can ensure the university mathematics public teaching materials selection meet the fundamental requirements of the development disciplines.

The important manifestation of the level of teaching mainly from teaching materials, the continually improvement of the teaching materials is good for the progressive development of teaching standards, which can provide an effective force. The development of the teaching level evaluation is to a definition for the level of science teaching materials, which also means acceptance of teaching materials form student continues to increase. However, as the fundamental element of the curriculum system construction, the construct of the level indicators of teaching materials architecture can generate a corresponding impact on the development of the course structure and curriculum setting, while lay the foundation for the construct of the curriculum level. The construct of features level indicators can fully reflect the interest characteristics of university mathematics public teaching, which can generate an important role of the participate enthusiasm of students. The evaluation index of teletext mainly reflects the reasonable match between accuracy of the course content and the chart of contents, not only enables compilation of teaching materials to achieve a harmonious, beautiful, more important is to improve the students' teaching materials acceptable levels[2]. This is the main aspect of the construct of college mathematics teaching materials evaluation system, which is also fully proved the basis of teaching materials evaluation system as a public university mathematics teaching materials to construct a quantitative evaluation model (TABLE 1).

THE INITIAL FORMATION OF QUANTITATIVE EVALUATION INDEX MODEL FOR COLLEGE MATHEMATICS

The scientific and effective evaluation was taken for the assess results of the construct process of the teaching quality evaluation indicators of college mathematics, then the corresponding evaluation and analysis can make. The further construct of the quantitative evaluation index model of college mathematics based on the analysis process can ensure college mathematics quality fully guaranteed. The quantitative evaluation index model of teaching materials was corresponding by analytic hierarchy process based on the constitute factors of the evaluation indicators, which can be divided into three main levels for further analysis. Taking scientific comparison and evaluation tothe quality of teaching materials to establish quantitative evaluation model. The construct process of model is divided into two major steps, specific establish methods are as follows.

Taking each secondary evaluation objective quantitative evaluation construct from the participating teaching materials as the basis

(a) Effectively determine the importance of participating teaching materials ordering of sub-goals and vector

In the constitution of the evaluation index from participating teaching materials, the sort of the importance of the secondary evaluation index was an important part of the differentiation of the evaluating the target, in which the valid sort of secondary evaluation objectives can fully reflect the fundamental characteristics of teaching materials quality. This is the concrete manifestation between same public courses with different teaching materials and important principle in different versions hierarchical division between the number and arrangement of materials. The participating teaching materials can be mainly divided into three levels according to level ordering vector of sub-goals. From the perspective of different levels of in-depth analysis, thus taking effective stratification of the importance of the overall goal, prompting secondary target vector of participating teaching materials can describe the higher low quality of teaching materials, which can provide effective protection for the general objective scientific layered vector[3].

TABLE 1: Evaluation index system

A aspect The overall objective of the evaluation	B aspect Evaluation of sub-goals	C aspect Evaluation Index
(A) Overall quality of teaching materials	(B1) Scientific level	(C11) Without views content, material mistake of fact, no logical reasoning and errors results
		(C12) Strong content applications, as far as possible to contact the actual production, focus on improving the ability of students to use mathematical thinking to solve practical problems
		(C13) In line with a systematic mathematical sciences
		(C14) Content with the level of compliance with conditions and students receive advanced, able to adapt to the needs of modern production of mathematical knowledge
	(B2) Teaching level	(C21) Note the application of dialectical materialism and historical materialism to explain the laws of mathematics, students of dialectical thinking
		(C22) To reflect the mathematics syllabus teaching content and teaching requirements, to complete the task of teaching in the class specified
		(C23) Easy to understand content, progress appropriately, properly handle important and difficult contents, in line with the actual level of teachers and students
		(C24) Able to build capacity to implement the prescribed syllabus, teaching ideas and mathematical methods educational goals, helping to train the students' creative thinking ability
	(B3) Architectural level	(C31) Three basic elements of curriculum development can organically combine
		(C32) Examples, exercises representative, typical, level, with appropriate number and moderate difficulty
		(C33) Properly handle the relationship with relevant subjects in the content and teaching materials methods
	(B4) Features interesting level	(C41) Characteristics, the characteristics should have the value in line with national conditions, whichcan be extended for use in a wide range
		(C42) Emphasis on student affective factors in subjects, for example, illustrations, text aspects have fun
	(B5) Figure and text level	(C51) Language refined, accurate and popular, smooth, consistent with the student's age characteristics and acceptance levels
		(C52) Charts, mathematical expression is correct, clear, beautiful, harmonious. Cooperation and coordination with the text
		(C53) Training students to use mathematical language in line with the objective laws described; terms, terminology, letters, symbols standardized, using the legal system of units

(b) Given proper quantitative criteria evaluation process for the secondary objective of participating teaching materials

The importance vector of each evaluate sub-goals was scientific sorted according to the given different versions of mathematics public curriculum materials in university. In that process, the basic principles should be followed in descending order of importance vectors, which should be conducive to the importance of hierarchical division sub-goals, but also

conducive to the analysis of different levels goal, making analysis with strong “targeted” with assessment of secondary objective, which can reflect the superiority of their own teaching materials. Its value of specific gaps will be fully reflected by the scientific sort of importance vector of secondary target of different versions of universities mathematical public curriculum materials. The scientific evaluation of the "differences" among secondary goal in different versions of teaching materials through data discrepancies, identify specific differences exist visual performance, making teaching materials secondary objective evaluation with a strong "comprehensive."

According to the sorting process of the importance vector of the teaching materials secondary target, the existence level was depth inquired. Depth analysis was taken for the specific advantages of its secondary evaluate objective depending on different levels, which can ensure the level more specific among different participating teaching materials. This is also able to fully reflect the importance of the secondary objective of the participating teaching materials on the overall performance of teaching materials quality. Among this, integrating the existed advantage with each other between the secondary evaluation goals can make effectively summary of the target with high or low levels. It is not only an important platform for mutual learning formed between the different versions of teaching materials, but also an important part of the overall evaluation of the teaching materials quality.

Making correct quantitative comparative evaluation for the rating overall objective of participating teaching materials

(a)Scientific identified the sorted importance of the overall goal of participating teaching materials and vector

From the overall evaluation objective, the quality of teaching materials should be regards the target layer factors and the entire sub-goals as a criterion level rating factors. Analytic hierarchy over three levels should regard different participating teaching materials as the program. Eventually identify all the total order of importance vector of the target layer from all the factors. The importance vector is the importance vector of the overall objective of the evaluation from different participating teaching materials.

During the analysis process under this level, the level single sorted weight vector from the all factors of the program layer on each factor of criteria layer is the sorted weight vector that different participating teaching materials to each sub-goal, and therefore do not need to be re-calculations.

(b)Making scientific and effective quantitative comparative evaluation to the overall quality of participating teaching materials

(1) Among different versions of university mathematics public curriculum materials identified, the importance vector of the overall goal of the evaluation should be scientific sorted. While the importance vectors should be in descending order, which will be more intuitive to show overall quality of participating teaching materials with different versions. The specific differences between the importance of the vector of overall objectives by the sorting process, the overall quality differences level based on the existence of the size difference should be scientific evaluated. It can make the scientific evaluation for the overall quality of teaching materials, so that overall quality of teaching materials with different versions can reflect the hierarchy; contribute to its analytic hierarchy process to achieve "systematic" and " comprehensive".

(2) During the analytic hierarchy process of the overall quality of participating teaching materials, the importance vector from all evaluation of secondary objective to the overall goal was sorted in order. According to this vector, the importance should be effective layout according to the size of its importance; greater vector was natural heavier importance, whereas the importance of the smaller vector is lighter. It can determine the impact vector of the evaluation of the overall target from the evaluation of sub-goals, and effective sorted its importance vector [4]. The sorted results can fully reflect the main factors influencing university mathematics public curriculum materials quality, and what factors should be scientifically improved in the late teaching materials selection process, thus making the selection of teaching materials can meet the internal demand of curriculum development, while providing impetus for the training of the ability related to the mathematics of college students. It can finally play the guide and regulation role of the teaching materials quality assessment, and form mutual unity and common progress between the quality of teaching materials and curriculum development.

Recycling and effective collation of evaluation data

The recycling and collation of evaluation data is to provide appropriate feedback of the construct and application of the evaluate model, which is one of the core aspect of the construct of the quantitative evaluation model of college mathematics teaching, but also an important basis of the valid analysis for the model levels of evaluation of teaching materials. During the analytic hierarchy process, the comparison and judgment for the matrix was the first step, which was constructed usually by questionnaire survey. Using the comparison and the judgment for the matrix to construct a quantitative evaluation model, the problems needed to develop form the survey questionnaire, and relevant teachers and experts to effectively fill, according to the questionnaire survey data collection and processing, establish the comparative judgment matrix of the analytic hierarchy.

EFFECTIVE APPLICATION CASE OF QUANTITATIVE EVALUATION MODEL OF MATHEMATICS TEACHING IN UNIVERSITIES

Develop appropriate questionnaires for teaching evaluation system construct issues by establishing the mathematical model quantitative evaluation of "applied mathematics"

Quantitative evaluation of teaching mathematical model to establish the factors set: all factors that affect the composition of the evaluation factors set object U, each factor in the U is divided into n classes according to their nature,

namely n subsets:U={U_1, U_2, U_3, U_4}, where U_1=(u11, u12, u13), U_2=(u21, u22, u23, u24), U_3=(u31, u32, u33, u34), U_4=(u41, u42). Establish weight set: first weight set A=(0.25, 0.35, 0.30, 0.10), second weight sets: A_1=(0.48, 0.22, 0.3), A_2=(0.20, 0.18, 0.32, 0.30), A_3=(0.25, 0.32, 0.2, 0.2), A_4=(0.5, 0.5).

Taking single factor evaluation can used to establish the fuzzy matrix R with fuzzy relationship. First, the grade distribution r_{ij} of each secondary indicator U_{ij} are given by the application of statistical data, so the evaluation matrix U_i of each level indicator are as follows:

$$Ri = \begin{pmatrix} r_{i11} & r_{i12} & r_{i13} & r_{i14} \\ r_{i21} & r_{i22} & r_{i23} & r_{i24} \\ r_{i31} & r_{i32} & r_{i33} & r_{i34} \\ r_{i41} & r_{i42} & r_{i43} & r_{i44} \end{pmatrix}$$

To calculate corresponding membership vector $B_j = A_j \bullet R_j$ for U_i of each first index, and finally get the total evaluation matrix and membership vector $B = A \bullet R$, then normalized B get $B = A \bullet R$, and thus obtain a final evaluation $C = B \bullet VT$

$$R = \begin{pmatrix} B_1 \\ B_2 \\ B_3 \\ B_4 \end{pmatrix} \begin{pmatrix} r_{11} & r_{12} & r_{13} & r_{14} \\ r_{21} & r_{22} & r_{23} & r_{24} \\ r_{31} & r_{32} & r_{33} & r_{34} \\ r_{41} & r_{42} & r_{43} & r_{44} \end{pmatrix}$$

In this paper, as described above, it can determine the ordering importance vector of three participating teaching materials to each sub-goal of the evaluation shown as TABLE 2.

TABLE 2: Three participating teaching materials to each sub-goal of the evaluation

	Sort weights				
	Scientific level	**Teaching level**	**Architectural level**	**Features interesting level**	**Figure and text level**
Teaching materials D_1	0.4128	0.3145	0.2716	0.2613	0.4561
Teaching materials D_2	0.2662	0.4816	0.5012	0.5616	0.3066
Teaching materials D_3	0.3210	0.2039	0.2272	0.1771	0.2373

According to the order of importance vector, the level of each secondary objective of three participating teaching materials was ordered shown as TABLE 3.

TABLE 3: The level of each secondary objective of three participating teaching materials was ordered

	Level sorting numbers				
	Scientific level	**Teaching level**	**Architectural level**	**Features interesting level**	**Figure and text level**
Teaching materials D_1	1	2	2	2	1
Teaching materials D_2	3	1	1	1	2
Teaching materials D_3	2	3	3	3	3

From the above two tables, horizontal position of each evaluation sub-goals of three participating teaching materials can be clearly seen, so clearly the advantages and disadvantages of each participating teaching materials[5].

From the above two tables, the scientific level, education level, architectural level, features interesting level and the figure and text level of the three participating teaching materials can fully realize the overall quality of teaching materials. Scientific level means the design of teaching materials, teaching content and student capacity training, which can play a

relevant role in training ability and development of students of mathematics teaching in college. The teaching level can actively guide teachers and students in mathematics teaching and provide the basis for continuous improvement of the quality disciplines, which can make university mathematics public curriculum materials selection with a strong "scientific." The architecture level is good or bad will decides the complete establishment curriculum system or not, the curriculum is reasonable or not, which can have a positive impact on the stage of teaching. The depth exploration of selection and evaluation of teaching materials can ensure the teaching materials selection process with a strong rational thinking, which can provide a solid base to build and improve the curriculum system. The features interesting level and the figure and text level were important factors in consist of the quantitative evaluation model. The features interesting level mainly refers the theory knowledge can generate impetus of simulating students to study or not, which promote the teaching process to reflect the "long-term nature "characteristics.

The figure and text level is the scientific evaluation for structure of language and graphic configuration, making the selection of materials can have a strong theoretical basis. Comparative evaluation of the two tables above, there is a gap between the each indicator in three teaching materials. The establishment and application of quantitative evaluation model is fully excavated between each teaching materials for the advantage of making the evaluation can effectively integrate, to provide a powerful guarantee to enhance the overall quality of public universities mathematics teaching materials.

Making comparative quantitative evaluation for each sub-goal evaluation of three participating teaching materials

As to the three participating teaching materials, each secondary objective evaluation can reflect the strong or weak of the "reasonableness" during the customized process of teaching materials. The evaluation index can adequately reflect the level of each evaluation target high or low of teaching materials, making the application value of college mathematics public curriculum materials evaluation model continues to improve, which can provide strong support to the "accuracy" of choose direction[6]. However, determine the importance of the vector for the overall evaluation goal of three participating teaching materials by the method described above shown as TABLE 4.

TABLE 4: The overall evaluation goal of three participating teaching materials

	Teaching materials D_1	Teaching materials D_2	Teaching materials D_3
Sort weights of overall quality of teaching materials	0.34244	0.4155.	0.24203

According to this order of importance vector, the overall quality of three participating teaching materials was sorted: overall quality $D_2$of materials was highest, followed by D_1, the lowest overall quality of teaching was D_3. According to the gap of the size of the sort importance, the gap between the overall quality of D2 and D3 was larger. The conclusion can be draw based on the sort results of the overall quality of three participating teaching materials, higher the importance value was, the overall quality of university mathematics public teaching materials was stronger. The lower the value of the sort described the teaching materials cannot be a college math public teaching materials. There are some evaluation flaws of teaching materials, which will have some adverse effects on teaching. It will produce the corresponding bad of the acceptance and application of students' mathematical knowledge, which has certain adverse factors to curriculum development.

However, according to the methods described above, to determine the sort weight vector that the overall goal of objective evaluation on full evaluation of the secondary shown as Figure 5.

Figure 5: The sort weight vector that the overall goal of objective evaluation on full evaluation of the secondary

	Scientific level	Teaching level	Architectural level	Features interesting level	Figure and text level
Sort weights of each sub-goal on teaching quality	0.3149	0.2149	0.1503	0.2149	0.1053

From the above sort of importance, it can be clearly observed that the standard of teaching materials, scientific level and features interesting level are the major factors impact the quality of the university mathematics public curriculum materials. As to the characteristics of the university mathematics public teaching, the content of the teaching process was more single, teaching methods and teaching process are more tedious[7]. The features interesting level can be effective in changing the participate enthusiasm of students, and thus make the teaching level continues to increase. It can be fully seen that features interesting level can influence the level of teaching, which stands the same important position with the level of teaching. Thus in the selection process of college mathematics public curriculum materials, it should ensure continue to improve the features interesting level with the scientific standard of teaching at the same time, which can stimulate students' interest in participating in linear algebra courses, making the teaching process to achieve "diversity" development. The traditional university mathematics public teaching will have the characteristics of qualitative change, while continuing to improve the standard of teaching. This is not only the main direction of contemporary college mathematics curriculum materials selection, but also the inherent power to continuously improve teaching evaluation objectives, which can make the

level of science of the teaching materials selection process and lay a solid foundation for strengthening the quality of teaching.

CONCLUSIONS

The establishment and improvement of teaching quantitative evaluation model has the actively significance for the materials selection from a scientific point of view. Taking evaluation index system with many aspects as fundamental and making effective evaluation for the level of teaching materials, in which sort the importance vector for sub-goal scientific, this forms the basis of the evaluation of the overall goal. Among that the advantages and disadvantages between the different versions of a university mathematics public curriculum materials can be fully reflected, and the advantage of different materials can be effective complement to provide a broad platform to continuous compose the process of teaching "science" and "rationality ", which fully reflects the specific value of the application of the teaching materials quantitative evaluation model.

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