Evaluation Model and Enhancement Strategies for Teaching Reform Capacity of Art Courses in Higher Vocational Colleges

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Abstract—In higher vocational colleges, the teaching reform of art courses faces complex problems, namely, the evaluation system is imperfect, and the evaluation model involves complex calculations. To solve these problems, this paper strives to enhance the teaching reform capacity of art courses in higher vocational colleges. Firstly, the factors affecting the said teaching reform were identified. Next, an index system was established to evaluate the teaching reform capacity. The index system was integrated with the gray theory into an evaluation model of the teaching reform capacity. Based on the evaluation results, several strategies were put forward to enhance the teaching reform capacity. The research results provide a good reference for higher vocational colleges to reform the teaching of art courses.

Keywords—Teaching reform, art courses, higher vocational colleges, index system, evaluation model.

1 Introduction

Higher education plays an indispensable role in the cultivation of modern senior talents. With the continuous development and progress of modern society, it has become more urgent to train the comprehensive high-quality talents [1-3], and also promoted the continuous transformation of the traditional test-oriented education model into a quality education model. As an important part of higher education, art courses in higher vocational colleges not only need to focus on the teaching of professional theoretical knowledge, but also the practical or technical knowledge. There is a more direct supply-demand relationship between the teaching of this professional course and the needs of modern society, to better reflect the quality of higher education [4-6]. However, following the continuous improvement of the higher education objectives and the social development level, the traditional education model has been difficult to meet the needs of modern higher education. Especially for art course teaching in higher vocational colleges that emphasizes more on the integration of theory and practice, teaching reform has gradually become a hot issue. Many research scholars have carried out a series of research on this and given some constructive research

results. For instance, Fischer et al. [7] discussed the relationship between school environment, teacher professional development, teaching practice, and student performance in the context of teaching reform. Besgen et al. [8] analyzed art and basic design education and explored corresponding art teaching strategies. Zhao [9] conducted analysis about the teaching status of art design education in the era of "Internet +", and discussed ways to reform art design education and teaching. Chen [10] studied the new ideas of art design education and teaching reform under the background of "Double First-class Major" program of the Ministry of Education and probed into the teaching reform strategy of art design education. Wang and Zhang [11] conducted a preliminary discussion on the teaching reform practice study of the "Internet +" digital art media major. Xia [12] took the 3ds Max course as an example to explore the teaching problems and countermeasures of art design major in vocational colleges. Wu [13] performed research and analysis on the reform and innovation model of film and television art teaching under the background of big data. Marciulyniene et al. [14] analyzed the practical teaching research of art students and discussed the teaching reform method by forming interdisciplinary groups with students majoring in computer.

However, the teaching reform of art courses in vocational colleges involves many influencing factors, making the decision-making analysis process vague and complicated. It's a very tedious process to handle related influencing factors. The existing research is often only based on a specific research perspective for correlation analysis, which limits the adaptability of their research results in certain degree. Moreover, different research scholars often have different opinions on how to effectively improve the teaching reform capacity of art courses in higher vocational colleges. To this end, this paper attempts to carry out further research and analysis on the enhancement for teaching reform capacity of art courses in higher vocational colleges based on the existing research results. It's expected to provide new solutions and measures for enhancing the teaching reform capacity of art courses in higher vocational colleges.

The remainders of this paper are as follows: the second part mainly analyzes the factors affecting the current teaching reform of art courses; the third part establishes a new evaluation model of the said teaching reform capacity; the fourth part gives the relevant measures and strategies for enhancing the teaching reform capacity; the fifth part is the conclusion of this paper.

2 The Factors Affecting the Current Teaching Reform of Art Courses

2.1 Professional qualities and abilities of the art professional teachers

Compared with other types of colleges, teachers in higher vocational colleges are generally weaker. Vocational colleges generally do not have the resource advantages in terms of talents, because the high-level professional and technical personnel or teachers with senior titles often choose excellent universities with better development

platforms and greater development potential. Meanwhile, there is the lack of opportunities for a large number of scientific research projects, the research funding of professional teachers is limited, and the salary of teachers in higher vocational colleges is generally difficult to compare with other types of colleges, which makes it difficult for the colleges to attract excellent talents, and fails to ensure the quality of the college's talent team construction. Especially for non-engineering weak disciplines such as art major, the faculty is even weaker. The overall comprehensive qualities and abilities of professional teachers often have certain defects, and professional teachers may only concentrate on part of course teaching. Also, their awareness of teaching reform is not strong or there is not enough motivation for teaching reform.

2.2 Construction of art course system

Generally speaking, the art course setting in higher vocational classes mostly focuses on application or technology, and more on the integration of professional theoretical knowledge and professional practical application. Thus, attention should be paid not only to the teaching of professional theoretical knowledge, but also the transformation of theoretical knowledge into student engineering practice and the cultivation of students' professional skills. All these need to be based on systematic professional courses. At present, art courses in higher vocational colleges include various forms of subdivided professional courses, such as digital media, art, and dance, etc. The course system should be established from both the macro and micro-perspective, i.e., it needs to include some professional basic courses and also highly targeted professional research or technical courses. Thus, for any type of art courses, a set of scientific and logical course system must be constructed according to the overall development plan of art professional development, especially the development of fine courses with art specialty features, so that the teaching reform of art majors has a good curriculum foundation.

2.3 Ability and level of art professional administrators

Judging from the current establishment of art professional management positions in higher vocational colleges, many high-level art teaching administrators or leaders often do not have knowledge or professional titles in the art major. In this situation, if they formulate corresponding art professional teaching plans or teaching development frameworks, it will often lead the development of art majors to deviate from the real art professional teaching needs. Especially if their management ability is insufficient, it will be difficult to make clear objectives and planning for the art course teaching reform.

2.4 Teaching methods of art courses

The teaching of art courses in higher vocational colleges is a combination of professional theoretical knowledge and professional practical knowledge or technical knowledge, so it cannot completely imitate the traditional classroom teaching mode,

especially in the process of changing from test-oriented education to quality-oriented education. To this end, it is necessary to combine the actual development needs of modern society, improve or reform the teaching methods of art courses, and form a teaching model suitable for the teaching needs of art majors in a modern environment. In addition, a variety of teaching methods should be comprehensively adopted according to the different art student groups. It's not appropriate to only use one.

2.5 Industry-university-research integration in art major

With the continuous deepening of quality education in art major of higher vocational colleges, more importance has been attached to industry-university-research integration in the cultivation of art talents. Through the industry-university-research training model, it can be seen that the complementarity between industry, academic and scientific research can be used to promote talent training more effectively. However, the industry-university-research training model isn't deeply implemented for the cultivation of art talents. This is because the art courses often only focus on academic links in the process of knowledge transfer, while ignoring the development environment of art industry and art major's application background of scientific research projects. The digital media major in the art category was taken as an example. This new art major of digital media has been formed due to the continuous development of digital media technology, that is, the development of digital media major must integrate the industrial background of digital media technology. And a digital media technology foundation must be formed through scientific research to promote the digital media technology. From this perspective, the degree of industry-university-research integration in the art major has an important influence on the art teaching reform.

2.6 Application of modern intelligent technology in art courses

Due to its rapid development, and especially the continuous application in the field of higher education, modern intelligent technology plays a very important role in improving the teaching quality of higher education. Considering that the teaching of art courses involves many professional knowledge points, traditional teaching methods are often difficult to effectively display the key points of the teaching content. For this reason, it is necessary to fully use modern educational intelligent technologies, such as big data, Internet+, Digital technology, virtual reality technology, information technology, and multimedia technology, etc., thus forming a rich and diverse art professional teaching methods and approaches. The application of intelligent technology in modern education for art majors will inevitably involve the investment of relevant teaching funds, which requires higher vocational colleges to invest a certain amount of education funds in the construction of software and hardware.

3 Evaluation Model for Teaching Reform Capacity of Art Courses

3.1 Principles for selecting the teaching reform capacity evaluation index of art courses

To ensure the proper selection of evaluation index for the teaching reform capacity of the art courses, it should follow the basic principles of scientificity, objectivity, systemicness, comprehensiveness and analyzability. Scientificity refers to a clear scientific meaning for the selection of evaluation index; objectiveness means that the selection should be based on objective facts; systemicness refers to rigorous logic; comprehensiveness means that the selection of evaluation index should consider the different levels of problem evaluation; analyzability requires the selected evaluation indexes to be easy for quantitative analysis.

3.2 The establishment of the evaluation index system for the teaching reform capacity of art courses

By analyzing the factors affecting the current teaching reform of art course, the authors attempt to evaluate the teaching reform capacity of the art course in higher vocational colleges from three aspects: the basic guarantee conditions for the art course teaching reform, the implementation process of art course teaching, and the teaching effect. First, in terms of the basic guarantee conditions, focus should be on the faculty of art courses, the configuration of hardware and software teaching facilities, the teaching reform of art courses, the investment of scientific research funds, the ability and level of management, and the construction of art course system etc. Then, the teaching implementation process of the art course needs to emphasize on the content, methods, means, approach, syllabus, and organization of teaching, etc. This can help to analyze whether the implementation status meets the current demand for the teaching of art courses in higher vocational colleges and provides corresponding support for the subsequent reform. Finally, for the teaching effect of the art course, it's necessary to focus on the achievements and application effects of the teaching reform of the art course, which can be comprehensively evaluated from the aspects of art students' graduation rate, students' excellent rate, student employment rate, brand promotion ability of art major, the growth of quality courses, the undertaking of art professional teaching reform projects, the participation of art major students in competitions, and the status of awards etc.

3.3 The weights of evaluation index for teaching reform capacity of art courses

For establishing an evaluation index system for the teaching reform capacity of art courses, it is necessary to perform weighting on different evaluation indicators. The AHP method has the characteristics of simple calculation, reliability and accuracy in

obtaining the index weights [15-19]. This paper uses the AHP method to process the evaluation indicators of the teaching reform capacity of art courses as follows:

(1) Invite relevant assessment experts in the field to compare and score the evaluation index of teaching reform capacity using the evaluation standard of 1-9, and form a corresponding evaluation matrix A,

$$\boldsymbol{A}=\begin{bmatrix} a_{11} & \cdots & a_{1i} & \cdots & a_{1n} \\ \vdots & \cdots & \vdots & \cdots & \vdots \\ a_{i1} & \cdots & a_{ii} & \cdots & a_{in} \\ \vdots & \cdots & \vdots & \cdots & \vdots \\ a_{n1} & \cdots & a_{ni} & \cdots & a_{nn} \end{bmatrix} \tag{1}$$

where, n is the number of evaluation indicators, aij is the evaluation value of the evaluation indicator i relative to the evaluation indicator j, and satisfies aii=1, 1≤aij≤9, $a_{ij}=\frac{1}{a_{ji}}, 1\le i,j\le n.$

(2) Obtain the maximum characteristic root λmax(A) of the evaluation matrix A, and also the corresponding consistency index value CI based on the maximum characteristic root and the number of evaluation indicators, namely

$$CI=\frac{\lambda_{\max}\left(\boldsymbol{A}\right)-n}{n-1} \tag{2}$$

(3) Based on the number of evaluation indicators, look up the table of random consistency indicators to obtain the corresponding value of random consistency indicator RI. Then, the consistency ratio CR is derived as:

$$CR=\frac{CI}{RI} \tag{3}$$

(4) Perform consistency test analysis. If satisfying CR<0.1, it means that the judgment matrix A is reasonable; otherwise, the judgment value given by the expert is unreasonable; at this time, it is necessary to re-evaluate the judgment analysis and then repeat the above steps until fulfill requirements.

(5) Obtain the weight of the evaluation index for the teaching reform capacity, namely

$$w_i=\sum_{j=1}^{n}a_{ij}\Big/\sum_{i=1}^{n}\sum_{j=1}^{n}a_{ij} \tag{4}$$

3.4 Evaluation process for teaching reform capacity of art courses based on grey cluster analysis

Different types of evaluation indicators were acquired and standardized to ensure a uniform dimension, and the value was between 0-1. In order to clarify the assessment levels of art teaching reform capacity, this paper applies the gray system theory [20-21] to perform gray cluster analysis of art teaching reform capacity [22-25], and classifies the evaluation indicators into 5 levels in terms of gray class: LV1 (excellent), LV2 (good), LV3 (medium), LV4 (general), and LV5 (poor).

For the excellent level LV1, the structure of its gray clustering analysis function φLV1(v) is shown in Figure 1.

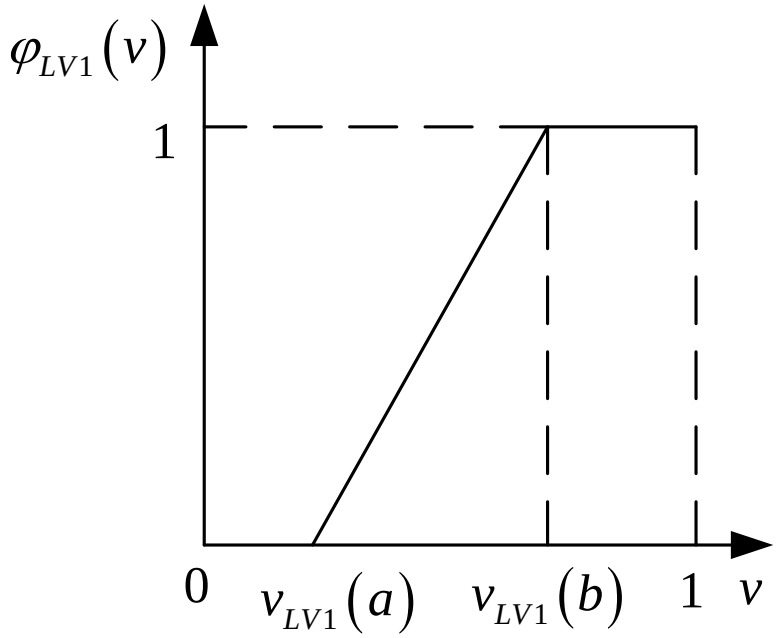

Fig. 1. Structure diagram of gray clustering function $\varphi_{LV1}(v)$

Figure 1 shows 0<vLV1(a)≤vLV1(b)<1; if the value of the evaluation indicator i is vi, the corresponding calculation model of φLV1(v) is expressed as:

$$\varphi_{LV1}(v_i)=\begin{cases}1 & v_{LV1}(b)\le v_i\le 1\\ \dfrac{v_i-v_{LV1}(a)}{v_{LV1}(b)-v_{LV1}(a)} & v_{LV1}(a)\le v_i\le v_{LV1}(b)\\ 0 & 0\le v_i\le v_{LV1}(a)\end{cases} \tag{5}$$

For LV2, LV3, and LV4, their gray clustering analysis functions are expressed as φLV2(v), φLV3(v), and φLV4(v) respectively, which are uniformly indicated by φLVk(v), and k∈{2,3,4}. Then, the structure of φLVk(v) is shown in Figure 2

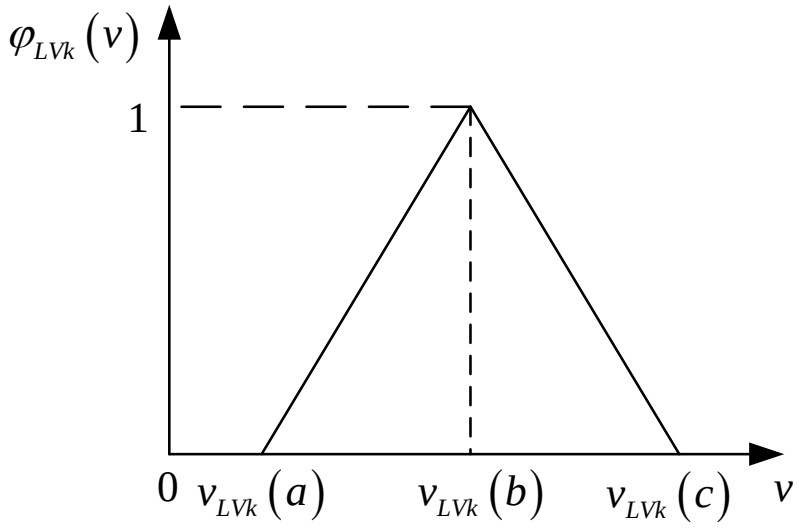

Fig. 2. Structure diagram of gray clustering function $\varphi_{LVk}(v)$

Figure 2 shows 0<vLVk(a)≤vLVk(b)≤vLVk(c)<1; if the value of the evaluation indicator i is vi, the corresponding calculation model of φLVk(v) is expressed as:

$$\varphi_{LVk}(v_i)=\begin{cases}0 & v_i \le v_{LVk}(a)\ or\ v_i \ge v_{LVk}(c)\\ \dfrac{v_i - v_{LVk}(a)}{v_{LVk}(b)-v_{LVk}(a)} & v_{LVk}(a)\le v_i \le v_{LVk}(b)\\ \dfrac{v_{LVk}(c)-v_i}{v_{LVk}(c)-v_{LVk}(b)} & v_{LVk}(b)\le v_i \le v_{LVk}(c)\\ 1 & v_i = v_{LVk}(b)\end{cases} \tag{6}$$

For the poor level LV5, the structure of its gray clustering analysis function φLV5(v) is shown in Figure 3.

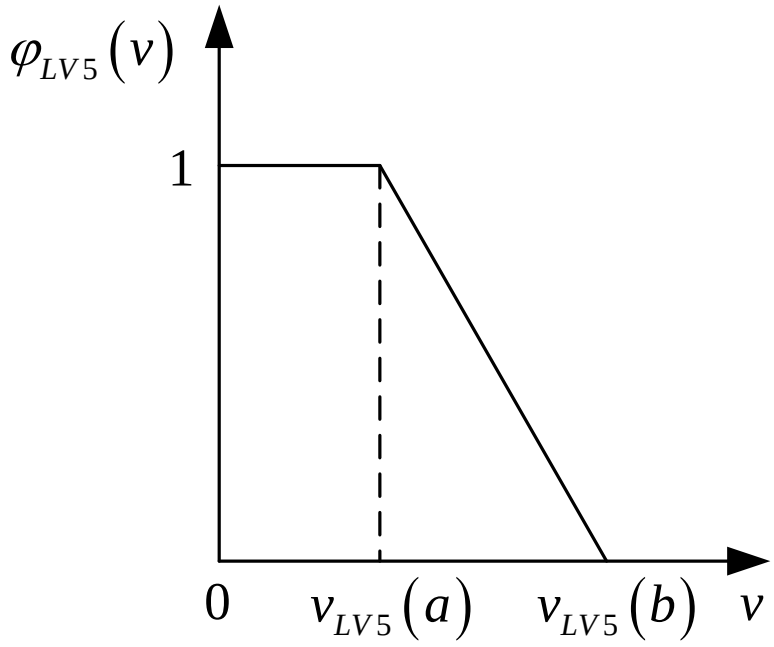

Fig. 3. Structure diagram of gray clustering function $\varphi_{LV5}(v)$

Figure 3 shows 0<vLV5(a)≤vLV5(b)<1; if the value of the evaluation indicator i is vi, the corresponding calculation model of φLV5(v) is expressed as:

$$\varphi_{LV5}(v_i)=\begin{cases}0 & v_{LV5}(b)\le v_i\le 1\\ \dfrac{v_{LV5}(b)-u_{ki}}{v_{LV5}(b)-v_{LV5}(a)} & v_{LV5}(a)\le v_i\le v_{LV5}(b)\\ 1 & 0\le v_i\le v_{LV5}(a)\end{cases} \tag{7}$$

The gray clustering analysis coefficient φLVj(vi) of the object to be evaluated was obtained for the evaluation indicator i and the gray class j, where 1≤i≤n, 1≤j≤m, and m is the number of gray classes for the evaluation indicator. Meanwhile, considering the weight wi of different evaluation index i, the comprehensive gray clustering degree ξLVj(v) of the evaluation object relative to all evaluation indicators and the gray class j is expressed as:

$$\xi_{LVj}(v)=\sum_{i=1}^{n}\left(w_i*\varphi_{LVj}(v_i)\right) \tag{8}$$

Therefore, it's possible to judge the gray class of the object to be evaluated according to the comprehensive gray clustering degree ξLVj(v), and then the teaching reform capacity. For the object to be evaluated with low teaching reform capacity, corresponding measures and strategies need to be taken to improve its teaching reform capacity of art courses.

4 Relevant Measures and Strategies for Improving the Teaching Reform Capacity of Art Major Courses

4.1 Improve the professional comprehensive quality of art teachers and enhance the construction of the teacher talent team

The primary link of improving the teaching reform capacity of art courses in higher vocational classes is to ensure the teacher team of art courses at a high level. In order to enhance the professional comprehensive quality of art teachers, regular professional skills training can be conducted for art teachers, especially in the comprehensive ability with professional characteristics; professional teachers are organized to participate in high-level international or domestic academic teaching, learn and absorb advanced teaching experience and enhance the teaching reform awareness of art teachers. In addition, to enhance the construction of the talented teachers, young and middle-aged teachers in the profession can be trained to form a talent reserve with artistic characteristics, while introducing high-level art professionals, which provides a good talent base for art talents construction.

4.2 Promote the ability and level of art professional management, and improve the rules and regulations of teaching reform

A good teaching management system is required to enhance the teaching reform capacity of art courses in higher vocational colleges. Its establishment relies on the good management ability and level of teaching management. Therefore, measures should be taken to effectively formulate the teaching management system of the art courses in the higher vocational colleges and thus provide good support for the teaching reform of the art courses. First, a solid art professional background is required for the teaching management team, so as to develop good planning skills for the professional development prospects and then formulate art professional talent training goals and programs suitable for the development requirements of modern society. Second, teaching management or leaders can combine the actual teaching situation of the art major and improve the art professional talent training plan in a targeted manner. Based on the related talent training plan, the corresponding teaching reform rules and regulations can be formulated, which provides guidance for the implementation of teaching reform.

4.3 Improve the ability of building a fine curriculum system for art majors and expand the knowledge dimension of professional curriculum construction

An important basis for improving the teaching reform capacity of art courses in vocational colleges is to ensure the systematicity and planning nature of art courses. The systematicity of art courses refers to the ability to form a set of completed art teaching courses, and to impart professional knowledge from different art levels; the planning nature refers to the sustainable development of art major courses, which can be dynamically developed according to the needs of art major teaching, and ensure the sustainability and competitiveness of the teaching reform and development of art majors in higher vocational colleges. The improvement in the systematicity and planning of art courses can guarantee the construction of art course, thus forming a series of fine art courses. Moreover, with the continuous development of the art courses in the higher vocational colleges, it is possible to build a dynamic development framework for fine courses in different art majors based on the existing professional course system, and then form a mature set of professional course system with multi-knowledge dimensions.

4.4 Enrich the teaching methods of art major and enhance the application ability of intelligent technology

Despite of the current teaching models (exam-oriented or quality-oriented education model) of art courses in higher vocational colleges, attention must be paid to the corresponding teaching methods and means due to the demands for various teaching methods of theoretical knowledge, practical knowledge or technical knowledge for art major. This is an important factor to improve the teaching effect and learning effect of the art professional courses in higher vocational colleges. Especially with the continuous development and application of various modern intelligent educational technologies, there have been higher requirements for their application in the teaching of art courses, which can effectively improve the teaching reform capacity of art majors and provide important supports for the improvement of teaching quality and efficiency. To this end, art professional teaching management and professional teachers should be familiar with various teaching methods, and effectively select teaching methods according to the different student groups; they should be also familiar with the current mainstream Intelligent teaching technology, and has a skilled use of various intelligent teaching equipment, so as to provide support for the implementation of art teaching reform.

4.5 Strengthen the industry-university-research integration in the teaching reform of the art major, and improve the practicality of the professional courses

The industry-university-research integration is a successful teaching model for the cultivation of senior talents in higher education, especially for the art professionals in

higher vocational colleges. The cultivation of art professionals not only involves theoretical professional knowledge, but also requires the practical verification of some theoretical professional knowledge and the formation of corresponding professional skills. On the one hand, the implementation of the industry-university-research model for the art major can reflect the theoretical knowledge transfer of art professional talent training; on the other hand, the art course teaching reform is linked to the needs of the art industry, making art professional talent training more targeted and oriented, which is more conducive to the integration of art professionals into society. In addition, the transfer of art professional knowledge and the cultivation of art professionals are both a gradual deepening process, that is, the process of integrating theory and practice; the art is from practice and is higher than practice. Then, it's a process of scientific research in the art major. Therefore, the industry-university-research integration in the teaching reform of the art major will be very beneficial to the improvement of its teaching reform capacity.

4.6 Increase the investment in teaching and research funds for art majors, and enhance the support of software and hardware in teaching reform

It requires the support of a large number of humans, material, and financial resources to enhance the teaching reform capacity of art majors in higher vocational colleges, which is also the basic guarantee condition for implementing the teaching reform. The authors believe that, among the investments in basic security conditions such as manpower, material resources, and financial resources, the investment in teaching and research funds for art majors is the most critical and most direct influencing factor. For this, on the one hand, higher vocational colleges can increase their teaching and research management funds in the art profession; on the other hand, they can seek financial support from social institutions and relevant art professional employment agencies, in order to ensure that the investment in art professional teaching and research funds can meet the needs of art professional curriculum teaching reform. Only in this way can it provide good hardware and software support for the teaching reform of art courses, e.g., build art multimedia classrooms, art teaching centers, art training bases, art practice centers, and art teaching and research offices.

5 Conclusion

The conclusions have been drawn as follows:

1) The factors affecting the teaching reform of art courses in higher vocational colleges were identified in this study, which is conductive to formulating the targeted enhancement strategies of teaching reform.
2) An improved evaluation index system and evaluation model were established, as a powerful means for effectively evaluating and analyzing the teaching reform capacity of art major courses in higher vocational colleges.

3) The relevant measures and strategies were given. This study shall provide good reference for enhancing the teaching reform capacity of art courses in higher vocational colleges.

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