Remittances Review
May, 2023
Volume: 8, No: 3, pp. 450-467
ISSN: 2059-6588 (Print) | ISSN 2059-6596 (Online)
remittancesreview.com

Received: 11 November 2022 Accepted: 15 March, 2023
DOI: https://doi.org/10.33182/rr.v8i3.31

Optimization of innovative teaching path of dance in universities based on ADDIE model

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Abstract

In today's rapid development of modern information technology, the way of teaching dance in colleges and universities is also gradually reformed and innovated with the development of technology. Based on the five principles of ADDIE model dance teaching design and development, this paper constructs an innovative teaching design model of teaching dance based on ADDIE, and makes a detailed analysis of each framework component. It also proposes the teaching design strategy based on ADDIE model from three dimensions: teaching content, teaching design and technical specification. To achieve the task of teaching dance from the ADDIE model, an overall teaching framework was constructed using a motion sequence prediction method complemented by audio-visual multimodal information. The results showed that the average performance of experimental class I was 49.42, and the average performance of control class I was 44.35, with a difference of +5.14. The average performance of experimental class II was 51.34, and the average performance of control class II was 45.13, with a difference of +6.77. The experiment verified the effectiveness of the innovative teaching path of dance based on ADDIE model proposed in this paper, which was applied in the dance class of colleges and universities, and provided a reference for the dance professional talent training provides a guiding reference.

Keywords: *college dance teaching, ADDIE model, instructional design, audio-visual multimodality, motion sequence prediction*

Introduction

Dance course is an educational course based on human science, which is practiced by unarmed or apparatus and other forms to the accompaniment of music, so as to form a fit and proportionate body form, develop good behavioral habits of sitting, standing and walking, and focus on practical training (Raheb, Stergiou, Katifori, & Ioannidis, 2019) (Macks, 2018). As an optional course of public physical education in colleges and universities, dance course has been loved by students (Kwak & Kwon, 2022) (Huang L Y 2016). How to keep students' interest in learning dance all the time and turn it into a way of their lifelong physical exercise is a question worth thinking about for our dance teachers (Meng, 2022) (Zhang, 2020) (Xuan Y 2018).

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Dance art is ultimately for ornamental purposes, especially to give the audience a beautiful visual experience (Shu-Hong L I 2017). The literature (Liang L 2017) argues that dance comes from the working life of the people, but the final expression should be higher than life and have a certain ornamental quality. The literature (Dong X B 2016) explains several models of public dance courses in colleges and universities. In the author's opinion, public dance courses should include elective courses and art groups, while its practice includes three modules of dance appreciation, dance combination, and dance performance teaching. The literature (X, 2019) summarizes and analyzes the current situation of dance education in Chinese higher education institutions, which mainly has the problems of no distinctive characteristics in the setting of majors, a large proportion of the students trained are "pan-dance talents" and the students cultivated do not reach a high level of comprehensive quality.

The ADDIE model is widely used in the field of education and has become a universal instructional design model recognized in the field of education, which has important theoretical and practical significance for guiding classroom teaching and resource design (Yao, 2021) (Lei S 2017). The literature (Wenwen, 2019) pointed out that the ADDIE model is a systematic problem-solving methodology, and that although instructional video resources are different from traditional learning resources, they still belong to the category of resource design and conform to the laws of instructional design. The literature (Tu, Zhang, & Zhang, 2021) argues that the ADDIE model, as a support carrier for the design, development, and application of instructional videos, integrates both theoretical guidance and video design, and teaches this course from five aspects: pre-analysis, process design, resource development, practical application, and evaluation. In this paper, we first construct an instructional video design model based on ADDIE, and refine and analyze each framework component. And the strategy of instructional video design based on ADDIE model is proposed from three dimensions of instructional content, instructional design and technical specification. Secondly, with the ADDIE model as the guide, we are committed to three aspects: theoretical foundation construction, model structure process explanation and teaching case design and application. Combining migration learning with improved spatio-temporal graph convolutional network, dance movement recognition is achieved. Finally, a motion sequence prediction method complemented by audiovisual multimodal information is used to convert 2D skeletal sequences into 3D sequences by means of a 3D conversion module. Different modal outputs of dance generation with 2D skeleton sequences, 3D skeleton sequences and image sequences will be obtained.

The design of college dance teaching based on ADDIE model

ADDIE model

The ADDIE model consists of five main phases: analysis, design, development, implementation, evaluation, and control. It consists of the initials of these five phases in English words, which are Analysis, Design, Development, Implementation, and Evaluation (Zhu W 2013).

Among them, the analysis and design stage is the primary foundation, the development and implementation stage is the main key, and the evaluation stage is an important guarantee, and the five stages are interrelated and complementary. Later the ADDIE model is considered as an instructional design process model that provides a problem solving idea for instructional design. Now the ADDIE model has become a common model for most instructional practitioners, and it provides a basis for solving various problems. The ADDIE model is a general model as shown in Figure 1. The five stages in the model are closely related to each other, and each stage in the model contains corresponding sub-stages. When we implement it, we need to pay attention to the specific steps of each stage in combination with the actual application context, and also with other learning theories and teaching models.

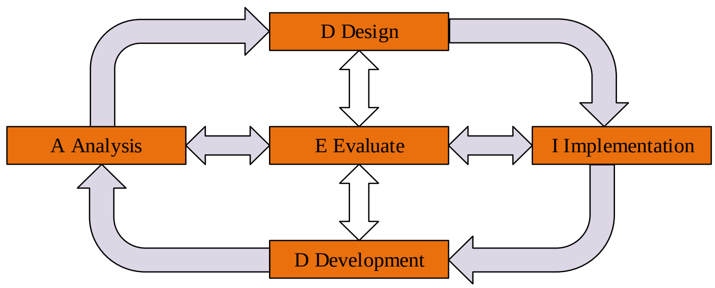

Figure 1: ADDIE model

Analysis instructional design

Analysis refers to a series of analyses of the behavioral goals, tasks, audiences, environments, performance, etc. that instruction is intended to achieve. The analysis phase includes four areas of analysis: analysis of student needs, analysis of learner characteristics, analysis of learning content, and analysis of the learning environment. The analysis model instructional design is shown in Figure 2.

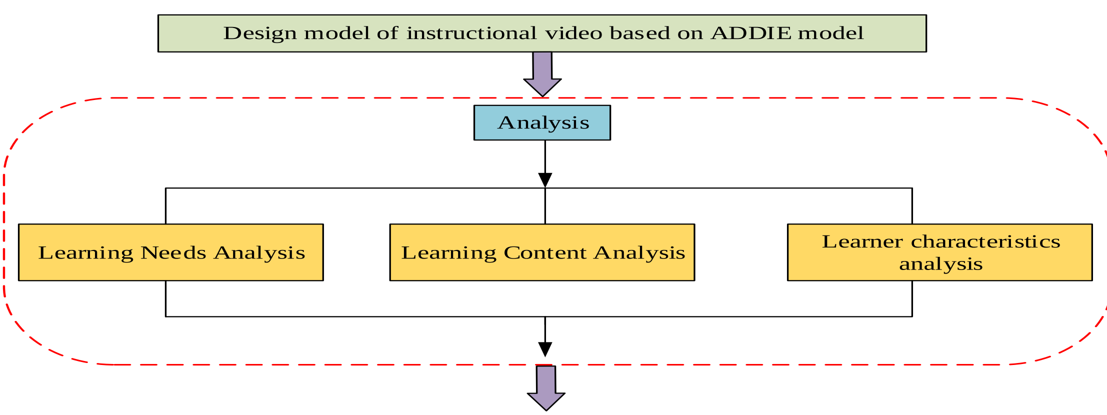

Figure 2: Analytical model instructional design

(1) The analysis of students' needs comes from two main sources: firstly, students' responses before and during the class, and then the teachers' teaching experience and the degree of grasping the important and difficult points of the curriculum system, and teachers can determine students' needs based on their previous experience.

(2) Learner characteristics include: general characteristics of learners and starting level analysis. General learner characteristics include: age, cognitive development level, and life experience.

(3) Analysis of learning content. The analysis of learning content for dance teaching consists of two main issues, the first of which is to determine the type of outcome of the content. Among them are whether verbal information, learning strategies, and information attitudes are compatible with each other through the transmission of Analysis, intellectual expression and motor skills using the form of Analysis to express and transmit. Furthermore, it determines the depth and breadth of the learning content and the relationship between the instructional components to achieve the corresponding instructional goals.

Design instructional design

Conduct curriculum design, which mainly includes determining teaching objectives, developing teaching strategies, arranging teaching procedures, teaching resources and selecting teaching tools. Screening and classifying knowledge or skills, and adopting different and corresponding treatment measures for different types of knowledge and skills. Make it possible to match the characteristics of learners. And through the corresponding activities to make them transformed from short-term memory to long-term memory, at the same time, the teaching objectives prepared should also be purposefully verified at this stage, and the corresponding strategies and means to evaluate the teaching effect should be designed, Design teaching design process is shown in Figure 3.

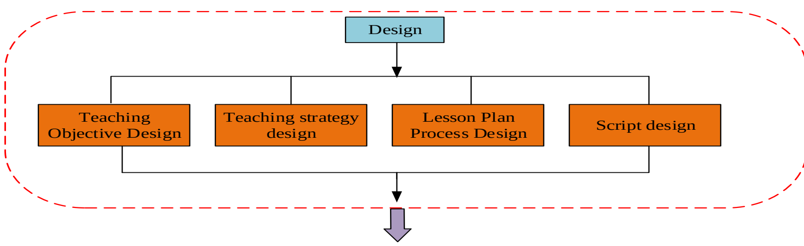

Figure 3: Design Teaching Design Process

Evaluation Instructional Design

The purpose of assessment is not only to evaluate the rationality of the course content itself, but also to evaluate the effectiveness of learning, find gaps and actively improve. To determine whether the innovative design of dance teaching is reasonable and whether it has positively contributed to teaching practice. The classification from the evaluation object mainly includes two aspects: evaluation of students' learning effects and teachers' self-assessment. The evaluation of the innovative design of dance teaching can be conducted both during the design, development and implementation process, and also after the implementation of the innovative design of dance teaching. Through interviews with teachers and students, questionnaires are distributed to understand the attitude and satisfaction of the innovative design of dance teaching and gain insights from it. Through comprehensive, objective and scientific evaluation, we can further improve and complete the shortcomings of the innovative dance teaching and learning. So that it can be more responsive to the cognitive characteristics of students and improve the quality of teaching, Evaluation teaching design is shown in Figure 4.

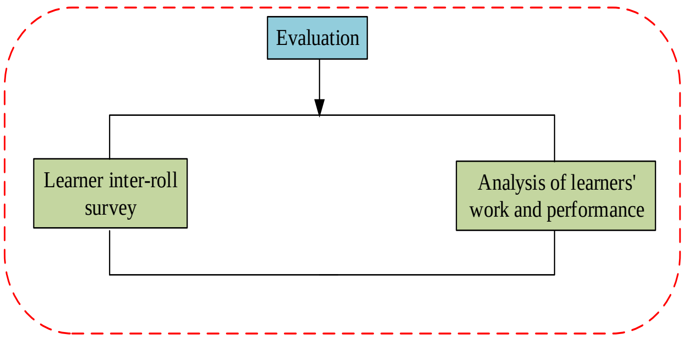

Figure 4: Evaluation Instructional Design Process

Innovative instructional design phase based on ADDIE model

Innovative teaching objective design

The instructional objectives are the expected learning outcomes for students, and the instructional activities are guided by the objectives and always revolve around achieving them. Instructional videos are shorter in time, so the objectives should be more focused.

The design of instructional videos should state clear and unambiguous objectives and not leave the learners to guess. Clear teaching objectives are the prerequisite for ensuring clear direction of teaching activities and improving learners' learning efficiency, which helps the scientific and standardized design and development of teaching videos, as shown in Table 1.

Table 1: Instructional Video Instructional Objective Design Template

Course Name	Dance Form Teaching
Teaching Chapter	Sports Dance
Teaching Objectives	Knowledge and Skills
	Processes and Methods
	Emotional attitude and values
Important and difficult points	Teaching focus

Teaching Difficulties

Innovative teaching strategy design

Teaching strategy refers to the means and strategies used to achieve different teaching results under different teaching conditions. The teaching strategy itself is not fixed, but relatively flexible. In the process of teaching video design and development, different teaching strategies can be flexibly adopted for different teaching contents, learners' individual learning styles and learners' cognitive levels.

Help learners to mobilize their interest in learning, break through the important and difficult points of knowledge content, and master more knowledge content in a short time. For example, a nine-stage teaching strategy is used in the class of operational skills to provide appropriate samples to attract students' attention and present stimulus materials to induce learners' learning behavior performance. The template of teaching strategy design for teaching cases formed in this paper is shown in Table 2.

Table 2: Template of teaching strategy design for teaching cases

Comparison content	Experimental group	Control group
Teaching Objectives	Cognitive objectives, skill objectives, emotional objectives	Cognitive objectives, skill objectives, emotional objectives
Teaching Method	The main focus is on inspiring teaching, but also explaining and demonstrating.	Explanation and demonstration method, teacher demonstrates students imitate practice
Teaching Steps	Student Learning Analysis A I Pre-Lesson Preparation	Announcing the content of the class a teacher action explanation demonstration
	Teacher pre-class video recording and pushing of class materials D -Student Preliminary Pre-Learning	Students imitate the exercises a correction guidance
	Teacher checks pre-study I classroom lecture	Students practice in groups - Students demonstrate in groups
	Collaborative group practice I Assessment E	Teacher's summary and assignment Set up the post-lesson homework with the same content as the experimental group

Innovative teaching process design

Teaching process design is a scientific, rational and orderly arrangement of many elements of teaching and learning based on curriculum standards, learning content, learner characteristics and learning needs.

Instructional process design is a teacher's planning of a lesson, a blueprint for creating efficient teaching and learning processes to solve teaching problems and optimize learning problems, and a technical process to improve learners' efficiency and interest in acquiring knowledge and skills. The teaching process design template for teaching cases developed in this study is shown in Table 3.

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Figure 3: Teaching process design template for teaching cases

Primary Indicators	Secondary Indicators	Test questions	Average score of each question	Average score of secondary indicators	Average score of primary index
Instructional Design	Organizational Structure	Teaching videos are organized in a logical way according to the knowledge points	3.92	3.61	3.75
		The teaching video is well designed with a coherent structure	3.72		
		The teaching video is organized in a reasonable time schedule with rhythm	3.83		
		Proper use of multimedia technology, using the appropriate control technology	3.64		
		Easy and flexible operation	3.23		
		The media presentation format is diverse and can effectively support the teaching and learning process	3.76		
	Interaction Design	Provide reasonable interaction and effective instructional feedback	3.93	3.71	
		provide interaction between learners and learning resources	3.69		
		provide interaction between learners and teachers and other learners	3.72		
		Provide interaction between learners and media interfaces	3.75		

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A framework for teaching dance based on audiovisual multimodality

To achieve the task of teaching dance from the ADDIE model, this chapter employs a motion sequence prediction method complemented by audiovisual multimodal information. Compared with previous direct dance movement instruction, the main reasons are: first, generating dance movements directly from music requires a large amount of paired information. Without a large amount of training data, the connection between dance movements and music cannot be inferred. Second, music is much more complex than movement. A typical dance has basic steps, and it would be much easier to learn the connection between movements directly than between the two. Third, the audio-complementary approach adds only the initial skeleton input and requires only a small number of important audio features. Overall, the framework proposed in this paper focuses on movement learning rather than relying specifically on audio information.

Overall Teaching Framework

The framework proposed in this chapter mainly includes 2D prediction module, 3D conversion module, audio feature extractor for audio dimension reduction, codec for image size reduction, evaluation module and other parts. Figure 5 shows that the input is audio information of size 13×4 and 2D skeleton information of size 23×2.

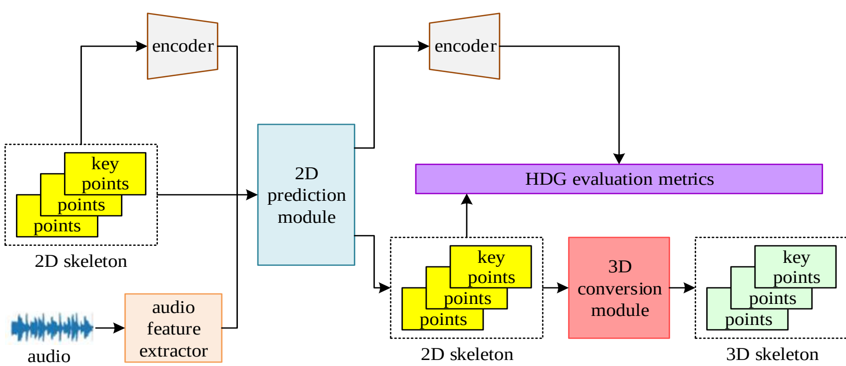

Figure 5: The overall framework of dance to music based on audio-visual

To make better use of the key point information, the skeleton key point information is reduced to a human body image and this is used as the third input with a size of 256 × 256. for audio information. Firstly, MFCC features are extracted and the number of cepstrum is set to 13 and the unit length is 4. Then the features are fed into the FCLSTM-FC layer (with parameters of 128, 64 and 16) for dimensionality reduction, and they are input to the 2D prediction module together with the skeleton information and the image information after being encoded. After processing by the 2D prediction module, the image encoding and 2D skeleton information of the next frame are obtained, and through the decoder, the image sequence is obtained. Through the 3D conversion module, the 2D skeleton sequences are converted to 3D sequences. Finally, the output of different patterns generated by the dance is obtained, which are 2D skeleton sequence,

Volume: 8, No: 3, pp. 450-467
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3D skeleton sequence and image sequence.

Teaching core modules

Codecs

Because of the large dimensionality of the input image data, it needs to be compressed using an encoder and then input to the subsequent network. This module uses the VAE design concept to encode the image information. This module consists of seven convolutional layers (encoder), seven deconvolutional layers (decoder) and an intermediate layer (fully connected layer). The number of convolutions is 64-128-256-512-512-256-128 for the encoder and 128-256-512-512-256-128-64 for the decoder. each convolutional and deconvolutional layer has a convolutional kernel size and step size of 5 and 2, and both are connected to a BN layer and the corresponding activation function layer. The intermediate layers utilize a fully connected network to obtain a mean vector and a standard deviation vector with dimension 512 dimensions, and then sample from the standard deviation vector and add to the mean vector to obtain the latent variables needed for the coding finalization. The specific settings are shown in Table 4.

Table 4: Structure of encoder-decoder

Decoding Levels	Output size	Layer structure
1st Floor	128×128×64	5×5,64,2,BN+Leaky-ReLU
2nd Floor	64×64×128	5×5,128,2,BN+Leaky-ReLU
3rd Floor	32×32×256	5×5,256,2,BN+Leaky-ReLU
4th Floor	16×16×512	5×5,512,2,BN+Leaky-ReLU
5th Floor	8×8×512	5×5,512,2,BN+Leaky-ReLU
6th Floor	4×4×256	5×5,256,2,BN+Leaky-ReLU
7th Floor	2×2×128	5×5,128,2,BN+Leaky-ReLU

The loss function of this module is as follows:

$$loss_c = -\sum_{i=1}^{I} x_i \log y_i + (1-x_i)\log(1-y_i) \quad (1)$$

$$loss_r = -\frac{1}{2}\sum_{j=1}^{J}\left(1+e^{\sigma_j}+\sigma_j+(\mu_j)^2\right) \quad (2)$$

$$loss_1 = loss_c + loss_r \quad (3)$$

Where, $loss_c$ denotes the cross-entropy loss, x is the input, y is the output, and I is the image size. $lossr$ denotes the relative entropy loss, and the input image can be obtained with dimension J of 512 for σ_j and μ_j through the encoder as well as the intermediate layer.

Volume: 8, No: 3, pp. 450-467
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For this codec module, the training needs to be done together when training. And when used, only the potential variables of the middle layer need to be obtained for subsequent fusion and prediction.

2D prediction module

In the 2D prediction module, the three modal features of the input skeleton, image, and audio are first stitched together, and then the stitched results are fed into the subsequent prediction layers. The prediction module consists of three LSTM layers, an FC layer and an MDN (mixed density network) with parameters 1024, 1024, 1024, 558, 558, respectively. The prediction here focuses on the temporal continuity of the dance movements and learning the feature associations between frames.

The purpose of introducing MDN in this module is to allow dance movements to follow a variety of possible actions. Therefore the model needs to predict not only one output per input, but also must have the ability to predict a range of different output values for each input.MDN models the output as the sum of multiple Gaussian random values, each with a different mean and different standard deviation, so that for each input, a mixed probability distribution can be predicted. This module uses the loss function of the MDN as the loss function of the prediction part. Its expression is:

$$P\left(U=u \| W=w\right)=\sum_{k=1}^{K}\varnothing\left(u,\mu_k(w),\sigma_k(w)\right)f_k(w),\sum_{k=1}^{K}f_k(w)=1 \quad (4)$$

$$loss_2=-\log(P) \quad (5)$$

3D conversion module

In order to convert the skeleton from 2D to 3D, this paper uses a human pose estimation algorithm to obtain human skeletal data. The algorithm learns the temporal information by constructing multiple frames of input using a convolutional network, which is manifested by using the 2D information of the first 25 to predict the 3D information of the 26th frame. In this module, the input consists of 25 2D skeletons with 23 joints. With four convolution blocks, the final 3D skeleton to be predicted can be obtained.

Open Pose is a milestone in pose estimation algorithms, providing a simple and efficient way for machines to understand human body information.

The Open Pose network consists of several stages, serially connected, each stage contains two branches, the first branch is used to obtain the confidence map S of the joint and the second branch is used to obtain the partial affinity field L of the joint. The computation process of the first stage can be expressed as:

$$S^1 = \rho^1(F) \qquad (6)$$

$$L^1 = \varphi^1(F) \qquad (7)$$

The S and L of each subsequent stage are obtained by summing the S and L of the previous stage with the original feature map F as Eq:

$$S^t = \rho^t\left(S^{t-1}, L^{t-1}, F\right), \forall t \geq 2 \qquad (8)$$

$$L^t = \varphi^t\left(S^{t-1}, L^{t-1}, F\right), \forall t \geq 2 \qquad (9)$$

To better predict S and L, each stage has a loss function, and the loss function for stage t is Eq:

$$f_s^t = \sum_{j=1}^{J}\sum_{p} W(p) \cdot \left\| S_j^t(p) - S_j^*(p) \right\|_2^2 \qquad (10)$$

$$f_L^t = \sum_{c=1}^{C}\sum_{p} W(p) \cdot \left\| L_c^t(p) - L_c^*(p) \right\|_2^2 \qquad (11)$$

where $S_j^*(p)$ and $L_c^*(p)$ are the labeled nodal confidence maps and partial affinity fields, respectively, $W(p)$ is equal to 0 or 1, and 0 means no labeling at pixel p. The overall training loss function value is equal to the sum of the stages as:

where $S_j^*(p)$ and $L_c^*(p)$ are the labeled nodal confidence maps and partial affinity fields, respectively, $W(p)$ is equal to 0 or 1, and 0 means no labeling at pixel p. The overall training loss function value is equal to the sum of the stages as:

$$f = \sum_{t=1}^{T}\left(f_s^t + f_L^t\right) \qquad (12)$$

$S_{j,k}^*(p)$ denotes the confidence level of the j th node for the presence of the k rd person at pixel p, which is calculated by Eq:

$$S_{j,k}^*(p) = \exp\left(-\frac{\left\| p - x_{j,k} \right\|_2^2}{\sigma^2}\right) \qquad (13)$$

Volume: 8, No: 3, pp. 450-467
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where $x_{j,k}$ indicates the true position of the j rd node of the k nd person. If there is more than one person's joint point at pixel p . Then there will be overlap, and here the maximum value is selected for processing as Eq:

$$S_j^*(p) = \max_k S_{j,k}^*(p) \tag{14}$$

The partial affinity field is calculated as:

$$L_{c,k}^*(p) = \begin{cases} v & if\ p\ on\ limb\ c,k \\ 0 & otherwise \end{cases} \tag{15}$$

$$v = \frac{x_{j_2,k} - x_{x_{j_1,k}}}{\left\| x_{j_2,k} - x_{x_{j_1,k}} \right\|_2} \tag{16}$$

For the human body, $x_{j_1,k}$ and $x_{j_2,k}$ denote the true positions of the j_1 th and j_2 th joints of the k rd person, and v denotes the unit vector in the limb direction. The partial affinity field vector is equal to the unit vector if pixel p is on the limb between joints j_1 and j_2 , otherwise it is 0. The set of points on the limb is:

$$0 \le v \cdot \left(p - x_{j_1,k} \right) \le \left\| x_{j_2,k} - x_{j_1,k} \right\|_2 \ and \left| v_\perp \cdot \left(p - x_{j_1,k} \right) \right| \le \sigma_l \tag{17}$$

where $v_\perp$ represents the normal vector and σ_l represents the limb width. If more than one body is included at pixel p , then the average is taken and calculated by the formula:

$$L_c^*(p) = \frac{1}{n_c(p)} \sum_k L_{c,k}^*(p) \tag{18}$$

The joint confidence map and partial affinity field are thus calculated, and the positions of the joint points can be determined by the joint confidence map.

After that, the partial affinity field integrals of the joint point pairs can be optimally matched using the human pose estimation algorithm, so that the bones can be connected to the human body and the information of all joint points of the human body can be obtained from the bottom to the top.

Volume: 8, No: 3, pp. 450-467
ISSN: 2059-6588 (Print) | ISSN 2059-6596 (Online)

Empirical results and analysis

Analysis of the teaching effects of the experimental and control groups before and after the experiment

Comparison of the experimental post-test dance scores between the experimental group and the control group

The comparison between the experimental group and the control group through one semester of teaching experiment, using the technical performance as a criterion for the post-test, was based on the data analysis of the experiment as shown in Table 5. The non-parametric test p-values under independent sample test were less than <0.05, verifying that there was a significant difference in student performance in the experimental group. Among them, the t-value for self-learning ability of class II was negative -3.597, indicating that the self-learning ability of the experimental group was significantly improved, which also further verified that the innovative teaching mode is beneficial to the teaching of form dance and significant to the mastery of students' skills (X±SD is the mean ± standard deviation).

Table 5: Significance analysis of the experimental and control groups in the post-test (X±SD)

	Experimental group	Control group	t	p
Self-learning ability 1 class	3.21+0.282	2.25+0.452	2.115	0.038
Imitation Ability 1 Class	3.45+0.545	2.14+0.475	3.952	<0.001
Self-learning ability 1 class	2.51+0.624	3.15+0.716	-2.171	<0.005
Imitation Ability 1 Class	2.67+0.597	3.73+0.657	1.522	0.025

Comparison of the dance performance of the experimental group before and after the experiment itself

By teaching the experimental group for one semester, the non-parametric test was used to determine whether the stimulus variables in the teaching experiment had an effect by comparing the technical scores of the experimental group before and after the experiment itself. By conducting the analysis the results are shown in Table 6, the p-values are 0.001<0.05, verifying that the innovative teaching mode has a more significant difference, and the experiments of the innovative teaching mode have a certain improvement for the students' self-learning ability and imitation ability. After a certain cycle of learning, the students' technical skill level has obviously improved, which has a certain influence on the teaching of the form dance program. It can be seen that the innovative teaching mode enhances students' learning ability and stimulates their learning potential while promoting their participation in class. In the teaching process, teachers should respect the individual differences of students to improve the teaching model, maximize the advantages of teaching, provide students with better learning platforms and ways to finally achieve the improvement of students' technical performance (X±SD is the mean ± standard

Volume: 8, No: 3, pp. 450-467
ISSN: 2059-6588 (Print) | ISSN 2059-6596 (Online)

deviation).

Table 6: Significance analysis of the ability of the experimental group in the pre-post test (X±SD)

	Pre-test group	Post-test group	t	p
Self-learning ability of Experiment 1 class	4.78+0.785	3.78+0.714	5.563	<0.005
Imitation ability of Experiment 1 class	4.88+0.445	3.17+0.475	8.122	<0.005
Self-learning ability of Experiment 1 class	4.94+0.341	2.12+0.641	14.563	<0.001
Imitation ability of Experiment 1 class	4.52+0.454	2.78+0.857	10.823	<0.001

Comparison of the final exam scores of the experimental group and the control group

Through a semester of teaching experiment, students' final grades were analyzed and summarized. Students' final grade assessment was divided into three parts: usual attendance (15%), dance form score (20%) and dance ability test (65%), with a total score of 100 (100%). Among them, the technical score accounted for the most and was one of the most reflective aspects of the students' progress, and the final technical exam was the Swan Ballet. Therefore, the final technical exam results of the experimental group and the control group were compared to verify the teaching effect of the innovative teaching model in the experimental group as shown in Table 7. The average score of the experimental class I was 49.42, and the average score of the control class I was 44.35, with a difference of +2.14. The average score of the experimental class II was 51.34, and the average score of the control class II was 48.13, with a difference of +0.77. This shows that the students in the experimental group had higher final exam scores than the students in the control group, which verifies the effectiveness of the innovative teaching model applied in the public body class of form and dance.

Table 7: Comparison of the final grades of the experimental group and the control group

	Number of people	Average grade		Number of people	Average grade
Experimental Class I	35	49.42	Control Class I	42	44.35
Experimental Class II	33	51.34	Control class II	38	48.13

Analysis of the psychological aspects of students in the experimental and control groups before and after the experiment

Analysis of students' interest in learning

In the comparison of the indirect learning interest rate, 56.5% of the students in the pre-test thought that "learning more different types of dance with my friends would help my physical sensation of dance". "I think it is interesting and I can learn a lot through the online teachers' Q&A and the caps of students' posts" accounted for 58.1%. In the post-test, 14.3% of the students thought that "learning more different types of dance with my friends would help me to feel the body of the dance". It means that through the semester of study, students' indirect interest is to learn more dance styles and exercise themselves with different styles, as shown in Figure 6.

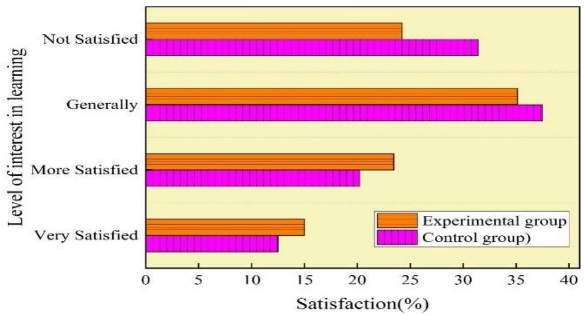

Figure 6: Statistical chart of satisfaction with existing learning interests

Analysis of students' spirit of solidarity

Figure 7 shows the graph of the degree of tacit understanding of mutual help learning among groups. Analysis shows that the students who thought that the discussion among groups in class was very cordial were the students of Marx College and Design College, those who thought it was very cordial were the students of Vocational Teacher Training College, and those who thought it was average were the students of Physics College and Environment, Capital, Technology and Information College. Most of the students in the experimental group thought that the implementation of group discussion in the class made the learning more harmonious and the communication between students gradually increased, but the students in the control group thought that there was no difference with or without group learning. At the same time, the assessment form of team formation was added to the usual group practice, and the team members' formation was submitted to the teacher as a group at the time of assessment, and each group was reflected by the students' work.

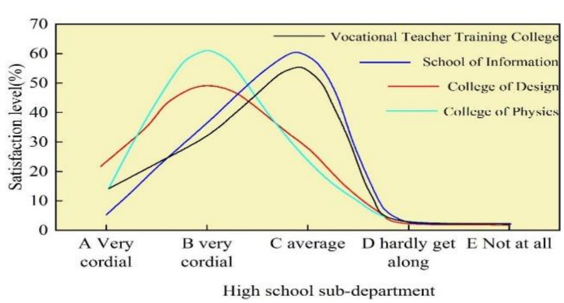

Figure 7: The degree of tacit understanding between groups

Conclusion

In this paper, we design and develop rich resources that are cutting-edge and close to the content of university dance disciplines and meet the professional characteristics of the teaching subjects based on the characteristics and design framework of ADDIE model, which can better meet the construction needs of course teaching resources and expand the depth and breadth of course teaching contents. The overall teaching framework was constructed by adopting a motion sequence prediction method supplemented by audio-visual multimodal information. Through a semester of innovative dance teaching experiments, the relevant data of the experimental group and the control group after the experiments were analyzed, and the following experimental research conclusions were drawn:

(1) Four students with poorer skills were selected for comparative analysis of pre and post-tests, and the difference between students in the experimental group was +19.3 and +15.8, and the difference between students in the control group was +10 and +12. This indicates that the learning ability (self-learning ability and imitation ability) of students in the experimental group has improved. The experimental group students' learning attitudes have changed, and the students' comprehensive ability has also improved significantly under the impetus of independent learning.

(2) In the post-test satisfaction, 18.0% of the students in the experimental class thought that the innovative teaching mode made the students' learning content more specific and systematic, and 10.3% of the students thought that learning different types of dance helped their body sensation of dance. It shows that the innovative teaching mode applied in the university dance public body class has a certain effect on the improvement of students' course satisfaction. In the real-time feedback of students' satisfaction students' interest in learning is improved compared with before, which in turn improves students' learning performance.

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