Construction and Application of Virtual Teaching Platform based on Multimedia and VR Technology

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Abstract. In the era of "Internet plus", it has trend to apply computer technology to classroom teaching and resource integration. Multimedia assisted instruction has been widely promoted and applied, making the traditional assisted education gradually develop into online assisted instruction. It solves the problems that the traditional teaching platform of computer aided education classroom has few times of use and the speed of information search is slow. This paper aims to reshape the role of teachers in the virtual teaching platform, stimulate discipline awareness, face the needs of students, improve teaching efficiency, and increase the SEL dimension. Focus on value leadership and other training strategies to promote the construction of enabling teachers. It helps teachers detect and evaluate the teaching effect of computer-aided design education application.

Keywords: virtual scene; computer aided design; teaching platform
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1   INTRODUCTION

Virtual experiments based on virtual reality technology are gradually popularized and applied in the reform of college education and teaching informatization. As an effective supplement to traditional experiments, virtual experiments can overcome the disadvantages of traditional experiments such as unreachability, irreversibility and high cost, and become an important means to strengthen experimental practice teaching, which is conducive to improving students' innovative practice ability. In the actual teaching process, virtual experiments broaden the extension of traditional experiments, create new fields, and further enrich the experimental teaching content. Han and Ge [1] studied a system suitable for psychological experiment teaching based on computer assisted virtual reality technology. The research results show that in the process of applying virtual reality technology, the school is committed to exploring new models under the background of network psychology experimental teaching. Include business management, e-commerce, logistics management, human resource management, accounting in the business

school, information management and information system, social work, public utility management and other majors in the management school, and tourism management, hotel management and other majors in the relevant colleges and universities. At present, these majors have the following problems in the actual teaching process. Liebermann and Erdelt [2] investigated the acceptance of pre-clinical students in learning tooth shape in virtual reality (VR). The Kolmogorov − Smirnov test was used to analyze the data, and the median and quartile range were used for exploratory data analysis. The evaluation of tactile and auditory teaching elements is more positive than the pure visual teaching elements of the comprehensive information board. Based on computer-aided design software, Jin and Yang [3] studied the technical problems in different 3D animation images. Through the color analysis model design of the environment, the teaching art supervision under the computer-aided design is carried out. Through the design of different parameters, the art model of the transaction is compared in animation technology. More vivid display of the true form of artistic design research objects. Zhang and Chen [4] evaluated and analyzed the teaching models under different postures, and made a theoretical and practical joint analysis and summary. Younes and Bairaktarova [5] carried out an automated scoring process. Through the teaching simulation of a virtual tool, the graphics are guided. Help students construct virtual teaching on homework. Its designed teaching system aims to improve students' design ability and innovation ability. According to the characteristics of design teaching, set up curriculum content and learning mode suitable for students' learning. Including design theory, design methods, design cases, and the use of related computer software. Zheng and Chang [6] Through practical operation, let students master the operation skills and design methods of CAD software, and continuously improve the design ability and innovation ability in practice. Ma et al. In the design practice, it combines the explanation of basic knowledge to help students understand the design principles and methods in depth and improve the accuracy and practicability of the design. Ma et al. [7] designed an Auto CAD network architecture design teaching system. This paper analyzes and compares the teaching models of teaching system based on network architecture, and introduces cluster analysis into curriculum resource management. Through holding design competitions and other activities, students' innovative potential and competitive awareness are stimulated, and their design and practical abilities are improved. Yang and Ren [8] studied that the teaching system of CAD innovative design is a teaching system based on computer-aided design technology. It aims to improve students' design ability and innovation ability. Help students master the operation skills and design methods of CAD software through curriculum, design competition and other ways. Improve the accuracy and practicability of the design and cultivate students' innovative awareness and ability. Liu et al. [9] use textbooks and video tutorials. Learning CAD system can make use of relevant textbooks and video tutorials, which can help learners better understand the use methods and skills of CAD software. At the same time, you can also communicate and share learning experiences with other CAD learners through online forums and communities. Liu and Liu [10] believe that the most important point of learning CAD system is to carry out practical operation. Only through practical operation can we really master the use methods and skills of CAD software. At the same time, it can also improve the design ability and innovation ability of learners. In short, learning CAD system needs to choose the appropriate software version, learn basic operations, use textbooks and video tutorials, and practice operations. Through continuous learning and practice, we can master the use methods and skills of CAD software and improve the design ability and innovation ability.

This paper adopts VR key technology. From the perspective of instructional design, research the scene of interactive instructional process design, and use 3dmax and Unity3D engine to construct the pre-class. Stereo vision constructs the 3D view required for teaching and design. A series of problems, such as the lag and aging of the course content. Finally, taking the "one scenic spot explanation" in the guide practice course as an example, the application test of the platform was carried out, and a questionnaire survey was carried out, and a preliminary study was carried out.

2 RELATED CONCEPTS AND THEORETICAL BASIS

2.1 The Theory of Educational Change

The virtual simulation training system can strengthen the control the intelligent management of teaching. Provide new teaching and management means for experimental staff. Strengthen students' mastery of experimental methods, cultivate students' initiative in teaching experiments, effectively improve students' enthusiasm for autonomous learning, and improve the quality of experimental education. Facilitate resource sharing, interactive communication, teaching cooperation and achievement evaluation. Virtual platform construction is designed and implemented for undergraduate teaching. The virtual simulation experiment teaching platform is a teaching mode based on computer technology, which simulates the real experimental environment and experimental operation process. This enables students to conduct experimental operations and analysis in a virtual environment, achieving the goal of reducing experimental costs, improving experimental efficiency, and improving experimental safety. The virtual simulation experiment teaching platform usually adopts a graphical interface, which is easy to operate and learn, and students can quickly get started. The platform can simulate the real experimental environment and the experimental operation process, so that students can experience the feeling of real experiments. Avoid students being injured or polluting the environment in the experiment, and ensure the safety and reliability of the experiment. At the same time, it supports the interaction and exchange between students, so that students can better understand and master the experimental knowledge. Finally, the platform is flexible and can be flexibly adjusted and customized according to different learning needs and experimental requirements.

In the era of internet, it is an inevitable trend to realize internet teaching. Further realizing, promoting and improving the informatization, virtualization and internet process of pathology experimental teaching. There is a shortage of teaching specimen resources and a single and backward experimental project. Safety problems and improper operation limit the experimental content, and students' learning interest and learning efficiency are low. Virtual technology has great advantages in Internet experimental teaching. In today's "Internet plus" era, progress with the times to achieve virtual network teaching is an inevitable means of educational reform and teaching innovation. Virtual teaching can save investment costs and realize resource sharing, with strong scalability, easy secondary development, autonomous operation and real-time interaction.

2.2 Overview of Computer Aided Design

From the latest technology buzzwords, "Computer Aided Design" (CAD) must be on the list. The Google robot AlphaGo under the pseudonym Master achieved a 60-game winning streak on the Go online platform, beating the Go master; the Computer Aided Design system developed by Carnegie Mellon University easily defeated 4 of the world's top Texas Hold'em players...The ability of Computer Aided Design is not limited to games, it has entered the daily life of Chinese people. When you shop on e-commerce platforms such as Taobao and JD.com, the online customer service that receives you is already Computer Aided Design; when you are too lazy to do housework, the sweeping robot can already plan the operation route to help you keep the room clean; entrepreneurs even use Computer Aided Design will provide people with various services such as college entrance examination voluntary filling and intelligent express mail collection. Thanks to the development of "deep learning" systems, AI has made remarkable progress in recent years, and can recognize all kinds of things with an accuracy close to that of humans. With the in-depth research of deep learning, the development of big data and cloud computing, and the improvement of algorithms and computing capabilities, this golden period of the Computer Aided Design industry has high expectations.
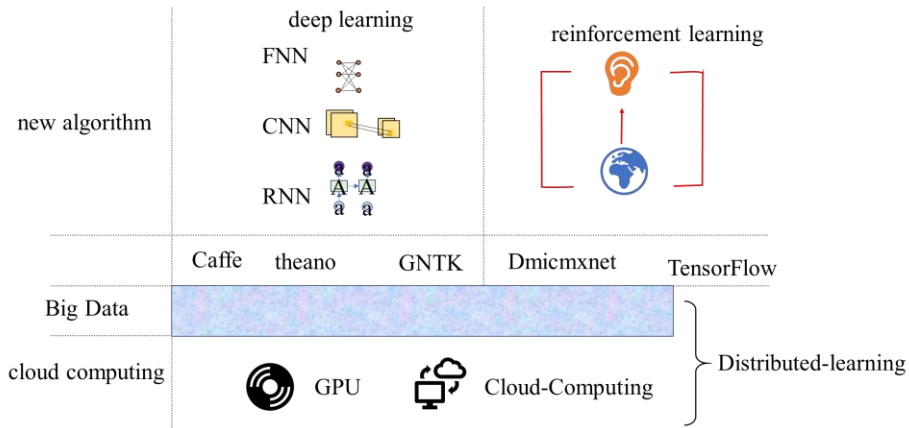
Figure 1: The cornerstone.

It is the comprehensive effect for the learning analysis and other technologies. It is not a single technology that can affect teaching. Therefore, the research combines Computer Aided Design, big data, learning analysis and other technologies. The integration and innovation with teaching will discuss the new opportunities and challenges background of the great development of Computer Aided Design as shown in Figure 1. To this end, on the one hand, it is necessary to enhance teachers' learning of SEL knowledge and skills in pre-service teacher education and post-service training, and at the same time, Computer Aided Design, big data and other technologies can be used to evaluate students' social-emotional abilities to help teachers improve education and teaching. On the other hand, teachers should achieve the coordinated development of intelligence and humanization in teaching practice, strengthen the value education and humanistic care for students, attach importance to the existence of fresh students' lives, protect students' privacy and data information security, prevent A "human empty field" appears.

2.3   Key Technologies of Virtual Teaching Platform

Object-oriented is the focus of the current computing community, and it was the mainstream of software development methods in the 1990s. From a macro perspective, object-oriented construction is more adaptable to software changes and minimizes the impact of changes. From a micro level, the object-oriented approach emphasizes the "responsibility" of each class.

In structured programming, data and operations on the data (that is, functions) are separated, and functions rely on the representation of data types. When the representation of data changes, all functions related to it must be modified, making the program difficult to maintain. On the other hand, structured programming starts with the function of the system, and decomposes. And as computer games become more and more complex, this programming method has more and more disadvantages of low stability, poor modifiability and reusability.

3   RELATED TECHNOLOGIES

Cluster analysis is called statistical methods because these calculation methods often use some basic concepts in statistics, such as mean, variance, correlation coefficient, etc. However, the data processed by clustering is not a sample of statistical significance, and generally does not require random sampling, nor does the research conclusion require extrapolation, and does not involve issues such as significance testing.

$$C_j \,|\, j = \{1, 2, \cdots k\} \tag{3.1}$$

$$\sum_{i=1}^{k} c_i = V \tag{3.2}$$

$$G_1 \cup G_2 \cup \cdots \cup G_k = X \tag{3.3}$$

The members G1, G2,..., GK in x are classes, and using graphically one or represent classes using expressions.

$$\begin{bmatrix} x_{11} & \cdots & x_{1f} & \cdots & x_{1p} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ x_{i1} & \cdots & x_{if} & \cdots & x_{ip} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ x_{n1} & \cdots & x_{nf} & \cdots & x_{np} \end{bmatrix} \tag{3.4}$$

$$\begin{bmatrix} 0 & & & & \\ d(2,1) & 0 & & & \\ d(3,1) & d(3,2) & 0 & & \\ \vdots & \vdots & \vdots & & \\ d(n,1) & d(n,2) & \cdots & \cdots & 0 \end{bmatrix} \tag{3.5}$$

The process of deepening, improving, and innovating education and teaching by using modern information technology to improve the quality and efficiency of education and teaching. Through digital technology and network technology, it makes education more popular and convenient, and makes learning more flexible and independent. It also promotes the improvement of teachers' teaching ability and educational management level. Education informatization includes various forms, such as electronic textbooks, online courses, virtual simulation experiment teaching platform, online education, distance education, etc. The data set is divided into several groups. The similarity between the data in each group is as large as possible, and the similarity between the data in different groups is as small as possible. We only need to find the similarity between the data automatically through the algorithm, and classify the similar data into the same category.

$$\forall x', x \subset X \, \forall x', x \in X \tag{3.6}$$

In general, a measure of similarity of clustering algorithms can be normalized as:

$$0 \le s(x, x') \le 1, \quad \forall x', x \in X \tag{3.7}$$

$$d(x', x), \forall x', x \in X \tag{3.8}$$

(1) Manhattan distance

$$d(i, j) = \left| x_{i1} - y_{j1} \right| + \left| x_{i2} - x_{j2} \right| + \cdots + \left| x_{im} - x_{jm} \right| \tag{3.9}$$

$$d(i, j) = \sqrt{\left| x_{i1} - x_{j1} \right|^2 + \left| x_{i2} - x_{j2} \right|^2 + \cdots + \left| x_{im} - x_{jm} \right|^2} \tag{3.10}$$

(3) Minkowski distance

$$d(i, j) = \left(\left| x_{i1} - x_{j1} \right|^q + \left| x_{i2} - x_{j2} \right|^q + \cdots + \left| x_{im} - x_{jm} \right|^q \right)^{1/q} \tag{3.11}$$

where q is a positive integer.

There are usually two schemes: statistical schemes and neural network schemes. Statistical model-based methods include COBWEB and Autoclass, and neural network-based models include SOM.

CLIQUE and Wave-Cluster are a mixture of density-based and mesh-based algorithms. In Figure 2 we give a graphical intuitive description of the classification of clustering methods:
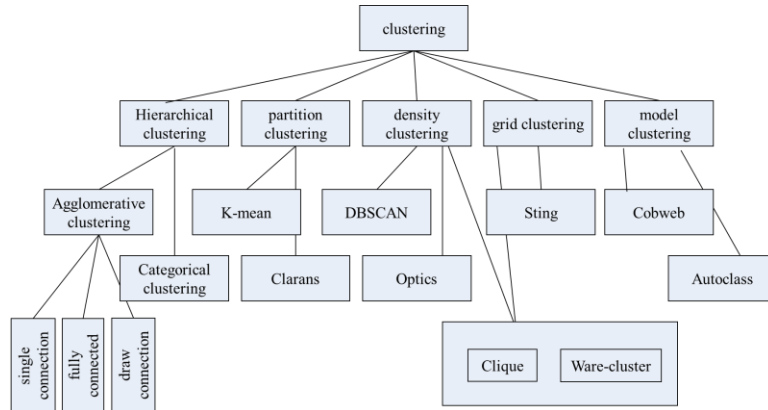
**Figure 2**: Classification of clusters.

4 EXPERIMENTAL RESULTS AND ANALYSIS

4.1 Implementation of Virtual Teaching Platform

To complete the design of a measurement virtual simulation software, first of all, it is necessary to study the physical object to ensure the correctness and integrity of the developed software content. Secondly, we should measure the size of the real object and take real photos for the next node. At the same time, in order to ensure the authenticity of the simulation object. Pre-development scripts and software planning are very important. They directly affect the direction of software development and ensure the correctness of software. Like the script of a movie, script is directly related to the quality of software and can significantly improve the efficiency of developers' development. Because this article applies to the unty3D secondary development platform, the editing function of Excell simplifies the operation. At the same time, it reduces a lot of workload and develops teaching software by designing scripts. After functional analysis of different clustering analysis data tables, compile the structure of different page display analysis, summarize the data analysis table content of the algorithm, and give examples for data analysis. At the same time, analyze the different clustering characteristics in the page, and then summarize the content records of the data table, and analyze the characteristics of all records. Finally, analyze the problem of the page. Through different learning suggestions and instructions, the contents of the chapters are included. The time complexity of GBKM algorithm mainly depends on the number of iterations and the dimension of data set. Because GBKM algorithm uses EM algorithm to solve the parameters of Gaussian model, it has many iterations and high time complexity. However, since the parameters of Gaussian model are solved independently, parallel computation can be used to reduce the time complexity. The spatial complexity of GBKM algorithm mainly depends on the size and dimension of the dataset and the storage of Gaussian model parameters. Because GBKM algorithm needs to store the category of each sample, parameters of Gaussian model and other information, its spatial complexity is high. The corresponding records in the information table Testhistory can check the results of the previous examination results for students to analyze and refer to.

4.2 Comparison of Test Results

Then the clustering ended, and the analysis results were obtained quickly. A total of 3 classes are obtained, and the initial center of each class completes the clustering quickly and efficiently at each clustering order.
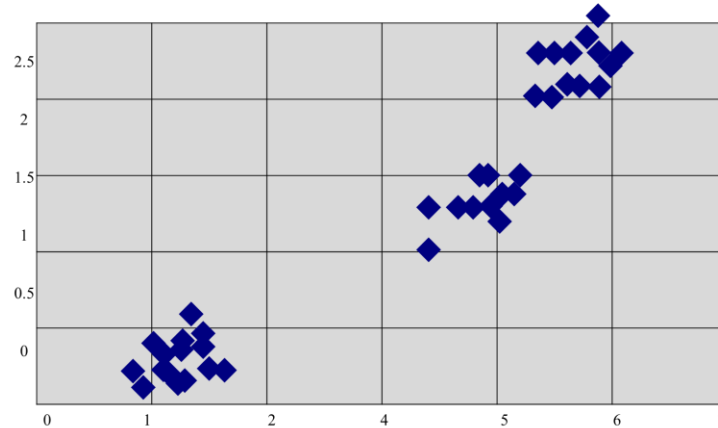
**Figure 3**: Clustering results for GB.

From Figure 3, we can see that the results of grid clustering lose a lot of points, and the clustering results are not satisfactory. This is because grid-based clustering only deals with high-density regions, and low-density regions are discarded, resulting in the loss of clusters. However, the results obtained The results of GBKM cluster ratio cluster analysis are shown in Figure 4.
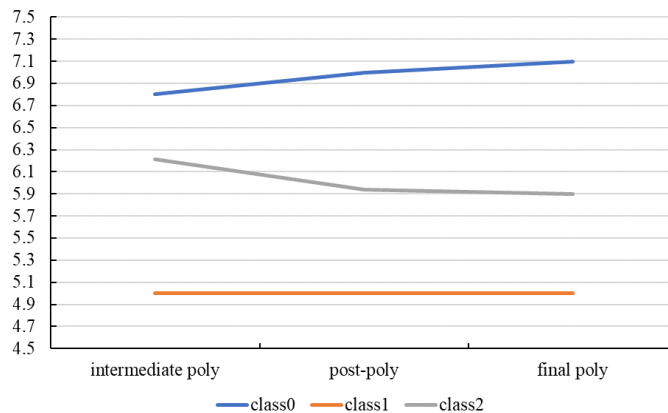
Figure 4: Initial cluster centers of GBKM.

Figure 4 shows the line graph of the change of the cluster center for efficiently. clustering. As shown in Figure 5, in the course, such K- implies selects some, which cannot capture the natural clustering center well. The initial cluster center is always changing, so that the algorithm cannot also increases to 11 times or even more.

Using the same Iris data, they were performed, their center points were compared each time. The centers are all for Figure 5, its cluster each time, and it shows that such polyline changes greatly, obviously, the less the cluster centers will be caught, it has to spend for this, such greater the ones. The final cluster centroids obtained after each experiment are not the same, or even very different. The ideal clustering result should be close to the natural clustering, that is, the clustering results are the same or similar each time, but the final clustering center obtained each time using the K-means clustering algorithm is very different, indicating that the results of each clustering are also quite different.
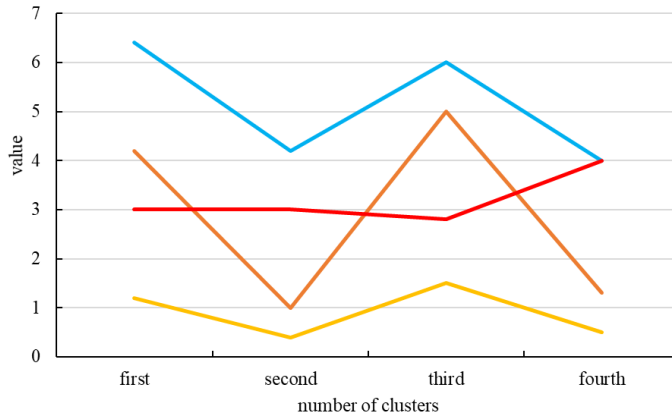
Figure 5: Initial cluster centers of K-means.

4.3   Evaluation of Intelligent Learning Platform

As shown, each polyline represents the characteristics of each class, that is, the trend of each chapter score of each class as shown in Figure 6.
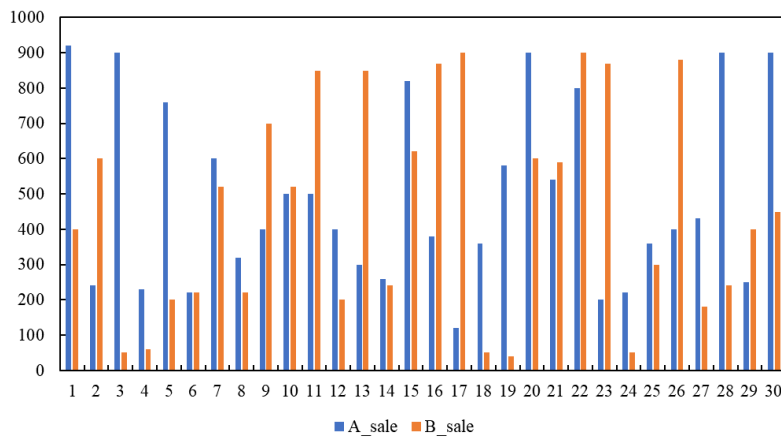

**Figure 6**: Feature comparison for each class.

As shown in Figure 7, this is the performance analysis page showing the characteristics of the clusters, as well as learning strategies and learning guidelines. On this page, you can see the comparison chart between the generated clusters. From the chart, you can intuitively see the difference between clusters and the characteristics of the cluster, which is much more intuitive and easier to understand than the text description. Its guidance provided are also very helpful to the students' learning.

The following article takes "Embedded C Language" as an example to compare. The changes in the test set parameters. From this, it can be concluded that the changes of test set parameters will affect the students. learning impact. First, give the original question rate for the course. As shown in Figure 8.
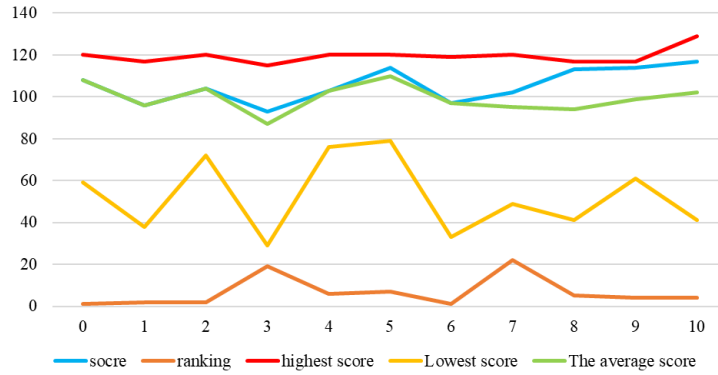
Figure 7: Preview of the Grade Analysis page.
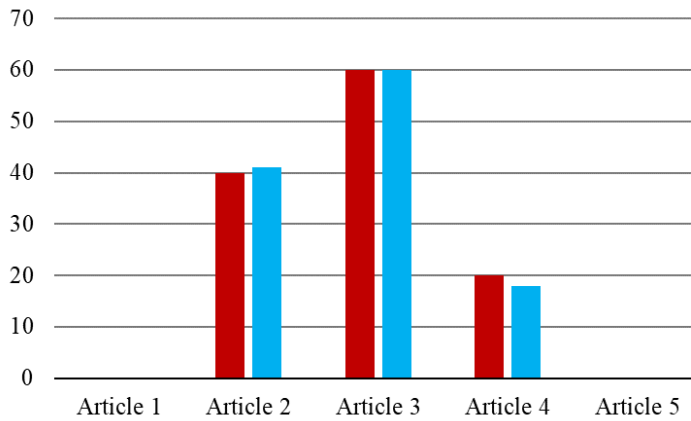
Figure 8: The ratio of original questions for each chapter.

When students do not analyze their scores, the structure of the test paper in the intelligent test paper, that is, how many points are in each chapter, are carried out according to Figure 8, that is to say, all students do not need to be so big regardless of how well they learn a certain chapter. If you have not learned a certain chapter well, you need to increase the number of questions in the chapter, and the test group system will issue questions according to the specified percentage.

However, the proportion of each student's question type is different under different practical intelligent test points. Basic analysis is required for different test results. As shown in Figure 9, it shows the proportional results of the repeated test group based on different questions.

From the above analysis, it can be concluded that the application of the GBKM algorithm to the personalized intelligent learning system realizes the implementation of personalized intelligent teaching for different students in different time periods.

5   CONCLUSION

The new round of scientific and technological revolution, represented by computer-aided design, is constantly reshaping the existing forms of education. As the core element of the relationship between "teaching and learning", teachers' professional qualities also need to be adjusted and upgraded. Teachers' intelligent educational literacy can be seen as a transformation and upgrading of the original teachers' information literacy, emphasizing the core values of educational functions

and teaching methods, as well as the irreplaceable development characteristics of teachers as "people". In addition, virtual experiment teaching can greatly realize the teaching practice of flipped classroom.
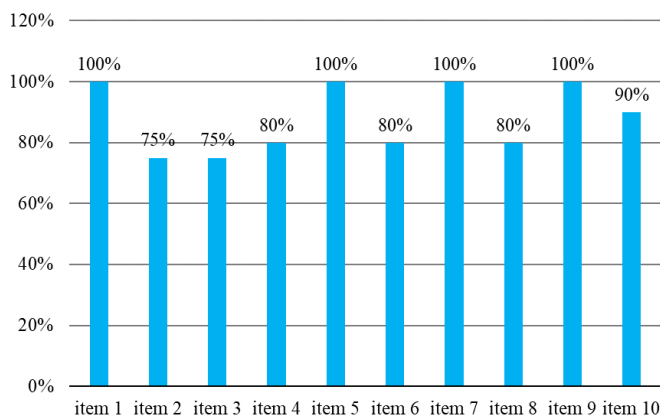
Figure 9: Scores for each chapter of students' test scores.

Flipped classroom is popular with teachers and students because of its flexible teaching form. In the experimental teaching, we need to use the pictures of slices and specimens, which are intuitive and obvious, and easy to learn, understand and master. Use the Internet to record the pictures involved in the class in the form of text explanation or audio recording in the video and upload them to the website. Students can learn in advance and find problems, which is more conducive to interaction with teachers in the classroom. Move "classroom teaching" to "pre-class teaching" in advance to avoid the disadvantages of traditional teaching mode that students preview without focus. Avoid the procrastination of traditional TV network courses. The new round of scientific and technological revolution represented by computer-aided design is constantly reshaping the existing forms of education. As the core element in the relationship between "teaching and learning", teachers' professional quality also needs to be adjusted and upgraded. Teachers' intelligence education literacy can be seen as a transformation and upgrading of the original teachers' information literacy. It emphasizes the core values of educational functions and teaching methods, as well as the irreplaceable development characteristics of teachers.

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