Hindawi
Scientific Programming
Volume 2021, Article ID 6380501, 10 pages
https://doi.org/10.1155/2021/6380501

Research Article

Application of QR Code Online Testing Technology in Nursing Teaching in Colleges and Universities

Hai-yan Zheng[1] **and Xing-cheng Ran**[2,3]

[1]*Nursing School, Hexi University, Zhangye, Gansu Province, 734000, China*
[2]*The School of Information Science and Engineering, Lanzhou University, Lanzhou, 730000, Gansu Province, China*
[3]*Information Construction Management Service Center, Hexi University, Zhangye, 734000, Gansu Province, China*

Correspondence should be addressed to Hai-yan Zheng; lzu_zhenghy@lzu.edu.cn

Received 19 October 2021; Revised 8 November 2021; Accepted 13 November 2021; Published 17 December 2021

Academic Editor: Bai Yuan Ding

In view of the current situation that the nursing teaching content is lacking pertinence and cannot effectively cultivate students' critical thinking, this paper puts forward the application analysis of two-dimensional code online testing technology in nursing teaching in colleges and universities. Through the analysis of two-dimensional code recognition technology architecture and common application fields, an intelligent nursing teaching platform for two-dimensional code online testing technology was designed. Systematically, we summarize the advantages of intelligent nursing teaching platform, use flash and 3D technology to complete the virtualization of nursing teaching scene, and use XML technology to update and save teaching resources; we further build an intelligent nursing teaching platform by using the basic plate, nursing station plate, ward plate, dispensing room plate, and case and operation review plate. The experimental results show that under the two-dimensional code online test technology, the nursing teaching method in colleges and universities has strong teaching resource processing efficiency, improves the operation level of students' nursing technology, and effectively cultivates the academic thinking of nursing students, which is of great significance to the progress of nursing teaching.

1. Introduction

Nursing teaching is the extension and expansion of higher education. It is an important period for nursing interns to organically combine theoretical knowledge and practical skills into clinical practice, cultivate their corresponding professional competence, and make a smooth transition from school stage to clinical stage [1, 2]. With the advent of the era of information globalization and the rapid development of new media forms that provide information and entertainment to users through terminals such as computers, mobile phones, and digital televisions, the pace of learning and life of modern people has become more rapid and convenient. With the wide application of smart phones, college students put forward new requirements for nursing teaching in colleges and universities [3, 4]. In the evaluation system of college teachers, it is required to increase the evaluation of teaching technology design and development ability in order to improve the teacher teaching evaluation system. It can be seen that college teachers need to use the new media platform to improve the quality of teaching work, whether it is the requirements of student groups or the education and teaching system. In recent years, educational experts, teachers, and students in educational practice are trying to explore new educational ideas and methods based on network. Teachers' new media ability not only includes the operation and use of various hardware equipment but also should flexibly use hardware to design and develop new teaching methods and display and transmit the teaching content to school students or social learners through various electronic media. The interaction in the classroom is not only the interaction of language, gestures, and looks between teachers and students, but also the interaction between teachers and media technology, students and media

technology. Therefore, the combination of traditional teaching mode and modern mobile information technology has become an inevitable trend.

Traditional nursing teaching uses teachers to teach at fixed places and at fixed times, which can complete the specified teaching tasks. However, due to the large number of students and the large classroom area, the traditional desk teaching has the disadvantages of poor teaching interaction, and it is not easy to eliminate skipping classes. The teaching method is boring [5–7]; therefore, two-dimensional code online testing technology is applied to guide nursing teaching in colleges and universities. Through the analysis of the basic application principle of two-dimensional code recognition technology, the focus of nursing teaching in colleges and universities is determined, the application database of multiplatform information nursing teaching is constructed, and the application principle of multiplatform information teaching in nursing teaching is determined [8], according to which the multiplatform information teaching is carried out. Relying on the intelligent nursing teaching platform for a systematic evaluation of each student, according to different assessment, results will be divided into different types of students, according to different types of targeted interest training and targeted interest guidance, to build a concise internal medicine nursing system, so that college students have a comprehensive understanding of internal medicine nursing. Breaking the traditional teaching method of fixed time and fixed place, relying on two-dimensional code online testing technology, training different types of students, assigning different homework at the same time, relying on the multiplatform information supervision system, supervising students in class, eliminating truancy, not finishing homework on time, and other phenomena are considered. We construct student-student learning group and student-teacher learning group to discuss nursing knowledge, increase communication with internal medicine nursing staff, and explain nursing according to the actual situation. We also complete the application analysis of two-dimensional code online testing technology in nursing teaching in colleges and universities.

2. Basic Application Principle of Two-Dimensional Code Recognition Technology

2.1. Architecture Analysis of QR Code Recognition Technology. In the process of practical application of QR code recognition technology [9, 10], data information can be recorded according to a certain plane distribution law through specific geometric figures, which belongs to a kind of bar code. The recognition process mainly realizes the automatic recognition of symbols by using the corresponding binary rules. Before the generation of two-dimensional code identification technology [11], the widely used one-dimensional code must be matched with the corresponding computer database in order to read the data information in the one-dimensional code and can only identify the product identification, while the two-dimensional code identification technology can realize the detailed description of the product. Figure 1 is a schematic diagram of QR code composition.

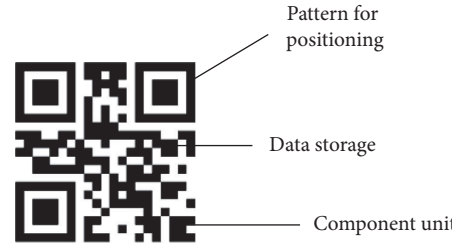

Figure 1: Schematic diagram of QR code composition.

At present, common QR code formats include PDF486, MaxiCode, Han Xin code, Aztec code, and QR code. Among them, QR code matrix is the most commonly used format in the industry, and the QR code in this format is called fast response code. As can be seen from Figure 1, the QR code has a square structure as a whole, and the patterns can be roughly divided into three types: positioning graphics, data storage graphics, and various organization units. The figure for positioning is the "back" character pattern in Figure 1, which is mainly used to realize the positioning in the recognition process. In the process of scanning the QR code, the user does not need to align the graphics and can effectively extract the relevant information in the QR code at any scanning angle. In QR code recognition technology, the storage form of data information is usually distributed according to matrix. In addition to supporting corresponding data and text information, it also supports the storage and display of various audio, video, and image information.

2.2. Common Application Fields of QR Code Recognition Technology. At present, QR code recognition technology has been widely used. According to different business forms of application, it can be divided into read type and main read type [12]. When the two-dimensional code recognition technology is applied in the read business field, the business information can generate the corresponding two-dimensional code graphics through different encryption and compilation methods. Send the graphics to the user's mobile data terminal, and the user can scan the QR code graphics with professional identification software. After obtaining the identification authority, the user can extract the corresponding information, which is often used as the transaction voucher for various applications [13, 14]. When applying QR code recognition technology in the main reading business field, users can install the corresponding QR code production client, scan the QR code on read-only media and other similar media, and obtain all information stored in the QR code graphics after decoding. At the same time, some QR codes also contain corresponding applications. Through scanning, you can directly open the corresponding programs to realize the functions of fast browsing of web pages and fast query of graphics and text.

In nursing teaching, the teacher assessment system requires to increase the assessment of teaching technology design and development ability and improve the teacher teaching evaluation system. Whether for students or the

requirements of education and teaching system, college teachers need to use two-dimensional code recognition technology to improve teaching quality. Experts in the field of education, educational practitioners, teachers, and students are trying new ideas and methods of network education. The teaching content is presented to school students or social learners through two-dimensional code recognition technology, so that it can be displayed and disseminated.

3. Construction of Intelligent Nursing Teaching Platform

In order to help students effectively realize the role transformation from nursing students to interns and then nurses and follow the trend of the times, an intelligent nursing teaching platform for QR code online testing technology is designed. Its multiplatform information-based teaching interest exploration system is shown in Figure 2.

As can be seen from Figure 2, multiplatform information-based teaching interest mining starts from students' consciousness, analyzes the behaviors that can stimulate teaching interest, classifies students into five categories, designs personalized teaching platform and personalized teaching model, and puts forward the design of personalized learning platform on this basis, so as to complete the multiplatform information-based teaching interest mining system, The specific design contents are as follows. As a new storage medium, the intelligent nursing teaching platform based on two-dimensional code online testing technology carries a large amount of information, small volume, low cost, and simple production. In addition, it is convenient for users to store two-dimensional code into mobile phones and use fragment time to learn and consolidate at any time. College students in the new era like innovation and are no longer confined to the traditional methods of teaching nursing in colleges and universities. The application of QR code in nursing teaching activities in colleges and universities meets the development requirements of the times and is worthy of clinical application and promotion.

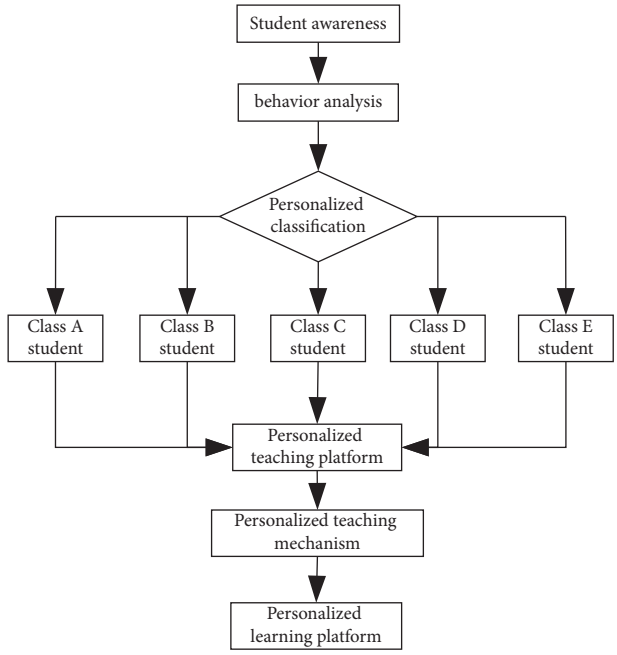

Figure 2: Interest exploration system of multiplatform information teaching.

3.1. Platform Design Concept. According to the different modes of users entering virtual reality (VR) and the differences of immersion level, combined with the research results of researchers at home and abroad in the field of VR and the real situation of its application in education, VR is divided into four categories: desktop VR, immersive VR, augmented reality VR, and distributed VR.

The platform should focus on simulating the real operating environment and process, not simply simulating the visual experience. Using the intelligent nursing teaching platform [15, 16], teachers can more thoroughly teach the operation process under the real nursing state and actively update teaching resources such as drugs and cases. Students can review and evaluate their learning results by themselves.

3.2. Development Environment. The key function of the platform is to standardize the nursing process and enhance students' ability to consult and analyze real cases. The platform is developed by using the current relatively complete flash integrated extensible markup language (XML) technology. Flash is a kind of animation software with rich animation content, short time, and strong interaction. It is widely used in web animation design. However, the application platform developed by flash also has some defects: it cannot be directly connected with the database, resulting in poor applicability of the platform application in data update. XML technology can take structural analysis of documents and information for transmitting and saving data. XML technology can operate and be applied independently of the database for lightweight data storage. Coupling flash and XML technology can make the nursing platform under QR code online testing technology have a better feeling of use.

3.3. Platform Teaching Resource Compression Algorithm. By compressing the data of teaching resources, it is convenient to complete the timely interaction between teachers and students and the efficient learning of students. Compression rate and compression deviation are the fundamental elements to weigh the compression of nursing teaching resources [17–19]. The resource compression ratio is the ratio of the number of compressed data to the number before compression, and the result is

$$\eta = \frac{N_b - N_e}{N_b} \times 100\%. \tag{1}$$

Set a total of N_b nodes in curve F and record them as

$$F = \{f_1, f_2, \ldots, f_{Nb}\} = \{(x_1, y_1), (x_2, y_2), \ldots, (x_{Nb}, y_{Nb})\}. \tag{2}$$

The fixed resource compression ratio $(0 \le \eta \le 1)$ is equal to the number of nodes N_e and $N_e = N_b \times (1 - \eta)$ of the

curve after compression, keeping N_e always an integer. Compress the curve F into a curve $F\prime$ with N_e nodes and minimize the compression deviation E.

Thus, the compressed curve F' is expressed as

$$F' = [f_1', f_2', \ldots, f_{\mathrm{Ne}}']. \tag{3}$$

It can be seen that F' is a subset of F, and any point in curve F' belongs to curve F. In the process of curve compression, the initial point and end point of the curve shall be saved to obtain

$$f_1' = f_1, \quad f_{Ne}' = f_{Nb}. \tag{4}$$

The total displacement compression $E_{\sum}$ is regarded as the evaluation criterion of compression deviation. If the connecting straight line T between point f_i and point f_j in the initial curve F is $y = ax + b$, the distance from the point $f_k(x_k, y_k)$ between the point f_i and the point f_j in the initial curve F to the straight line T is d. If some curves in curve F are compressed into subsegments of curve F', the compression deviation generated is

$$E_{\sum}(f_s', f_{s+1}') = E_{\sum}(f_i, f_j) = \sum_{k=i+1}^{j=1} \frac{(y_k - ax_k - b)^2}{1 + a^2}. \tag{5}$$

Calculate the curve F' after the compression of nursing teaching resources [20, 21], that is, each node of N_e in curve F', and minimize the value of compression deviation function:

$$E_{\sum}(F\prime) = \min \sum_{s=1}^{Ne-1} E_{\sum}(f_s', f_{s+1}'). \tag{6}$$

The fundamental theorem of dynamic programming algorithm is to resolve the problem to be solved into multiple subproblems, calculate the subproblems in advance, and then obtain the calculation results of the original problem from the solutions of many subproblems. For the optimization calculation of the deviation function of the compression of nursing teaching resources in the platform [22], first set a two-dimensional state space Ω without continuous relationship, and establish the correlation between the number of nodes N_b of curve F before compression and the number of subsegments of curve $F\prime$ after compression. If the number of $F\prime$ subsegments of the compressed curve is H, the expression of state space Ω is

$$\Omega = \{(n_b, h) | n_b = 1, 2, \ldots, N_b;\ h = 0, 1, \ldots, H\}. \tag{7}$$

The random point (n_b, h) of the state space Ω represents the compression optimization of the curve $\{f_1, f_2, \ldots, f_{n_b}\}$ with n_b nodes. The compressed curve contains h subsegments; that is, $n_e = h + 1$ nodes. Therefore, the final solution state of the nursing resource compression problem is (N_b, H), and the compressed curve $F\prime$ is a line from state $(0, 1)$ to state (N_b, H), which is recorded as P. In the state space Ω, the cost function $D(n_b, h)$ of the state (n_b, h) is also set, which is the compression deviation of the curve $\{f_1, f_2, \ldots, f_{nb}\}$ with n_b nodes that becomes h subsegments after compression.

The process of calculating the minimum deviation is to find the best path from state $(0, 1)$ to (N_b, H). Simplify the state space Ω and obtain the following boundary function constraints:

$$\begin{aligned} L(h) &= \frac{h+1}{N_b}, \\ R(h) &= \frac{1}{N_b - H + h}, \\ B(n_b) &= \frac{1}{n_b - N_b + H}, \\ T(n_b) &= \frac{n_b - 1}{H - 1}. \end{aligned} \tag{8}$$

The solution process of resource compression optimization problem is described by the following recursive analytical formula:

$$\begin{aligned} D(n_b, h) &= \min_{L(h-1) \le j < n_b} \left\{ D(j_h - 1) + E_{\sum}(f_j, f_{n_b}) \right\}, \\ A(n_b, h) &= \arg\min_{L(h-1) \le j < n_b} \left\{ D(j_h - 1) + E_{\sum}(f_j, f_{n_b}) \right\}. \end{aligned} \tag{9}$$

In order to improve the compression speed of nursing teaching resources [23–25], an improved method of adaptively modifying the search range is designed. A reference compression path is derived by Douglas–Peucker method and expressed as formula (10), and then the next iteration calculation is carried out by virtue of the reference path P, and the last calculation result is used as the reference of the next iteration.

$$P = \{p(0), p(1), \ldots, p(H)\}. \tag{10}$$

Construct the lowest deviation search space $\Omega\prime$ and enhance the search rate. Since the reference path has been obtained in the previous step, the path can be used to create a search strip to reduce the search range. The corner shape of each point in the path is different; that is, the compression degree is not equal. The search strip width W will be adjusted adaptively according to the change of compression degree. The boundary function of the improved search space $\Omega\prime$ is described as

$$\begin{aligned} L(h) &= \frac{\max\{h+1, h + (p(h) - p(h-1)) \times H/N_b\}}{h+1}, \\ R(h) &= \frac{\min\{N_b, h + 2 \times (p(h) - p(h-1)) \times H/N_b\}}{N_b, H = h}. \end{aligned} \tag{11}$$

The key of the improved method lies in the compression deviation and searching for the minimum compression deviation. For each node, the deviation from other nodes shall be calculated, and the complexity of its calculation time shall be set to $O(WNb^2/H)$. There are WH state space points in the process of resource compression. The time complexity of minimum deviation search is set to $O(WNb/H)$.

Therefore, it is obtained that the time complexity of nursing teaching resource compression under QR code online testing technology is $O(Nb^2W^2/H)$.

Through the above process, the compression of nursing teaching resources can be completed in the shortest time [26], which not only ensures the stability and fluency of the platform, but also solves the practical problem of small memory of the mobile terminal.

3.4. Platform Design Process. Based on the real investigation and research and the guidance of relevant experts, the platform planning and design process is shown in Figure 3. After logging into the platform, the user selects the nursing time, browses the patient's condition information and relevant nursing planning, and matches the patient with reasonable medication time according to the nursing planning and cases and patient's physical condition [27, 28]. The design process refers to the real nursing process and records all the operation behaviors of users in the process as a powerful voucher for follow-up investigation.

3.5. Platform Structure Implementation. Using browser/server mode structure and modular design strategy, the global platform functions are divided into basic plate, nursing station plate, ward plate, dispensing room plate, case and operation review plate, as shown in Figure 4.

In the whole platform, the basic plate is the most critical. Its design principle is based on the complete investigation of the real nursing environment and process [29, 30]. It uses system analysis to extract public attributes for several application goals and program goals and envisages the scalability of the platform in the future. The basic section includes the environmental variables required to initialize the platform, adjust user operation records, and extract basic data such as department and examination indicators according to the real nursing situation of the hospital [31, 32].

The nursing station plate, ward plate, dispensing room plate, case plate, and other plates present independent characteristics, which can provide students with corresponding nursing data under simulated ward detailed environmental conditions [33–35]. Such sections use the information stored in a large number of XML files. Dispensing room and ward are the core communication plates, including communication between patients and nursing students and drug matching [36]. The platform will record the user's operations in all sections as the basis for the final assessment.

The operation review section compares the existing data such as cases and medical orders according to the operation records of the platform users, comprehensively judges the user's global simulation process, finds out the wrong behavior and missing nursing process, and gives corresponding reminder information, so as to complete the application analysis of QR code online testing technology in nursing teaching in colleges and universities.

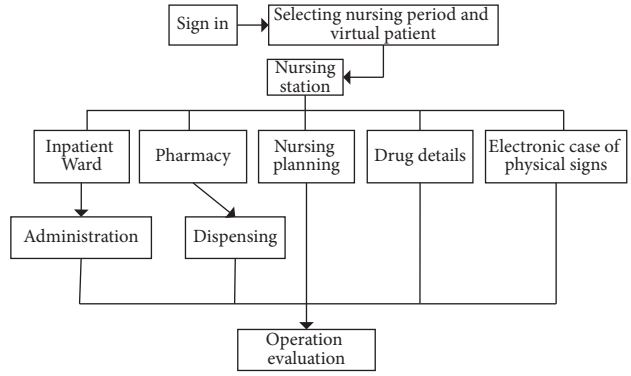

Figure 3: Platform planning and design process.

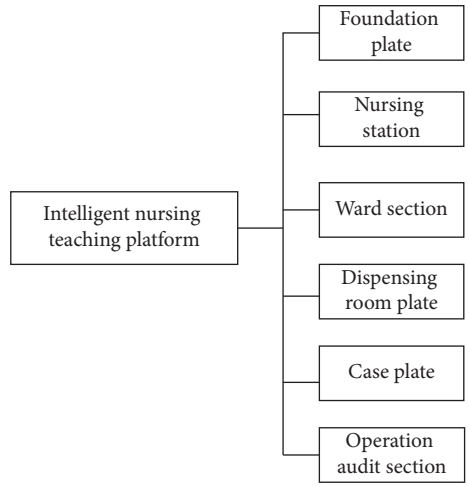

Figure 4: Schematic diagram of platform structure.

4. Experimental Analysis

In order to ensure the effectiveness of the two-dimensional code online testing technology proposed in this paper in college nursing teaching, simulation experiments were carried out. In the process of experiment, students studying in the course of internal medicine nursing in colleges and universities were taken as experimental objects, and numerical quantification was carried out for students studying in the course of internal medicine nursing in colleges and universities, which was conducive to the rapid progress of simulation experiment. The different learning abilities and the difficulty of learning knowledge points of the experimental objects are simulated and quantified. According to the quantitative results, the simulation experiments of educational interest cultivation, educational diversity, and educational interaction are carried out. Through the experimental demonstration of interest cultivation, educational diversity and interaction, the effectiveness of the application analysis of the two-dimensional code online test technology proposed in this paper in nursing teaching in colleges and universities is verified. In order to ensure the preciseness of the experiment, the traditional teaching method is used as the comparison object, the traditional

teaching method is quantified, the results of two simulation experiments are compared, and the experimental data are presented in the same data chart.

4.1. Data Preparation. In order to ensure the accuracy of the simulation experiment process and set the experimental parameters of the test, in this simulation experiment, students of internal medicine nursing courses in colleges and universities were used as experimental objects, using two different teaching methods to carry out the simulation experiment of cultivating educational interest and educational diversity and analyzing the simulation experiment results. Because the analysis results and analysis methods obtained by different methods are different, it is necessary to ensure the consistency of experimental environment parameters in the experimental process. The experimental data setting results in this paper are shown in Table 1.

4.2. Simulation Experiment of Cultivating Educational Interest. The data of 6000 students were quantified to construct different learning ability parameter values, with the unit of D. From 0 to 1.0 d, 0.1d to 0.2 d are class A students, 0.3 d to 0.4 d are class B students, 0.5 d to 0.6 d are class C students, 0.7 d to 0.8 d are class *D* students, and 0.9 d to 1.0 d are class *E* students. According to different types of students and different learning abilities, the simulation experiment of cultivating educational interest is carried out in three environments: simple, moderate, and difficult. In the process of experiment, we should pay attention to the quantification of students and the quantitative expression of the nature of simulated experiment. Because interest is a subjective parameter, human consciousness is heavy, and different quantitative methods lead to different conclusions. Therefore, Jeffrey Hall's interest analysis model is used in the simulation experiment of educational interest cultivation, and the interest simulation constant is used as the parameter to quantify interest, with % as the parameter unit. The analysis principle is to construct different internal medicine nursing teaching options and use students with different learning abilities to click, judge, and click the modules they are interested in according to the degree of difficulty. If the number of clicks is high, it is considered that there is strong interest. On the contrary, the interest in medical nursing is relatively flat. Using the same personnel and the same quantization mechanism, build the same learning ability as the abscissa and the interest simulation constant as the ordinate. The experiment is simple, moderate, and difficult. The experimental results are recorded in the simulation experiment result curve of educational interest cultivation. During the experiment, because the analysis results cannot be directly compared by using two different education and teaching methods, the third-party analysis and recording software is used to record and analyze the experimental process and results, and the results are displayed in the curve of the experimental comparison results. In the simulation experiment result curve, the analysis function is used to eliminate the uncertainty caused by the factors of simulation laboratory personnel operation and simulation computer equipment. The simulation experiment of cultivating educational interest is carried out only for different experimental objects using different education and teaching methods. The comparison curve of the simulation experiment results of educational interest cultivation is obtained, and the comparison curve of the experimental results is shown in Figure 5.

By analyzing the comparison curve of the simulation experiment results of educational interest cultivation in Figure 5, it is concluded that the teaching application method proposed in this paper is more obvious than the traditional teaching method, and the improvement of students' interest is more prominent in different stages. In the simple experimental environment, with the traditional teaching method, the learning ability increases from 0 to 0.5 d, and the interest simulation constant increases by 10% for each 0.1d increase in learning ability, of which the 0 to 0.5 d range is class A weariness, class B passive, and class C mechanical students. However, in general, class A, class B, and class C students have low ability to cultivate interest in traditional teaching methods. The average interest simulation constant of the three types of students is 55%. Cultivating interest is not ideal. When the learning ability exceeds 0.6 d, the interest simulation constant is higher than 80% on average, indicating that the simulation experiment is in a simple state, which has little impact on the interest of class *D* enterprising students and class *E* autonomous students, and can obtain high interest through traditional education methods. It is concluded that the traditional teaching method is not obvious enough to cultivate interest in students with low learning ability. This paper puts forward the teaching application method. In a simple simulation environment, the overall change is moderate and close to a straight line, indicating that the change of learning ability has no obvious change on interest behavior. Students with poor learning ability also have high learning interest. When the learning ability is 0.1d, the interest simulation constant of the teaching application proposed in this paper is 80%, which is close to the learning ability of 0.6 d in the traditional teaching method. This paper puts forward the teaching application. When the learning ability exceeds 0.6 d, the interest simulation constant is greater than 86%. Compared with the traditional teaching method, the interest simulation constant of the same type of students is increased by at least 6%. At the same time, this paper puts forward teaching application methods. Different types of students have similar interests, the span of interest constant is small, and the overall operation is good. However, traditional teaching methods are easy to cause interest polarization, resulting in academic performance polarization. Class *E* and class *D* have better academic performance, and class C, class B, and class A have poor academic performance; it shows that the teaching method proposed in this paper plays a positive role in promoting students' interest in a simple simulation environment.

When the simulated experimental environment is moderate and difficult, using traditional teaching methods, students with different learning abilities have different specific manifestations of interest. Under the moderate

Table 1: Experimental parameter setting.

Project	Execution range/parameters	Remarks
Number of students	6000	Male : Female = 1 : 1
Analog quantization parameters	0.1–1.0	Normal distribution
Student level	Colleges and universities	Students majoring in internal medicine nursing
Test difficulty	0.4,0.7,0.9	Simple, moderate, and difficult

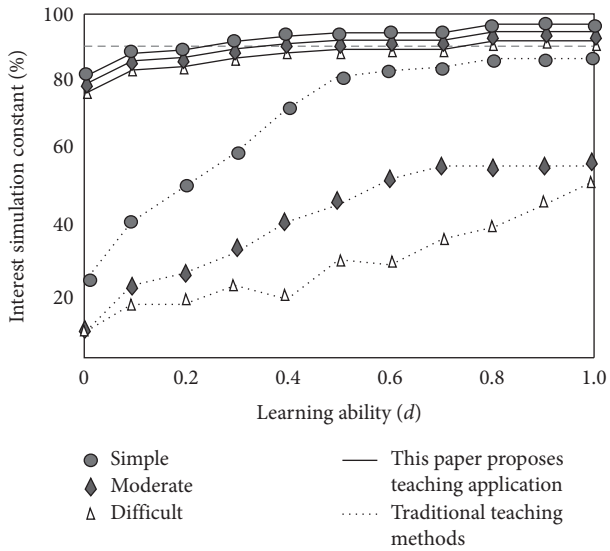

Figure 5: Comparison curve of simulation experiment results of educational interest cultivation.

experimental simulated environment, the curve trend is basically similar to that under the simple environment, but the interest simulation constant is lower than that under the simple environment. Under the moderate difficulty, the learning ability is before 0.7 d, rise in restricted line. When the learning ability is 0.7 d, the interest simulation parameter is 55%. In the range of 0 to 0.7 d, the learning ability is improved by 0.1d and the interest simulation constant is increased by 5%. When the learning ability is greater than 0.7 d, the interest simulation constant presents a stable state of 55%. Similarly, it has a greater impact on class A, class B, and class C students and less impact on class *D* and class *E* students, but the interest simulation constants of class *D* and class *E* students are not good enough at this time. In the difficult experimental environment, the traditional teaching methods improve linearly as a whole and have different effects on different types of students. When the learning ability is 0.4 d, the interest simulation constant decreases briefly. The highest interest simulation constant is 50%. In the range of learning ability from 0 to 0.6 d, the interest simulation constant increases in stages, and two growth platforms appear. Class A, class B, and class C students with learning ability ranging from 0 to 0.6 d have low interest. The learning ability increases linearly from 0.6 d to 1.0 d. For every 0.1d increase in learning ability, the interest simulation constant increases by about 5%, and the overall performance is poor. In this paper, the simulation constant of interest in teaching application is proposed, which is basically consistent with the curve in simple case. The average interest simulation constant in difficult environment is 2.5% different from that in moderate environment, and the average interest simulation constant in moderate environment is 2.0% different from that in simple environment. The overall curve is stable. The minimum interest simulation constant in complex environment is 75% and the maximum interest simulation constant is 89%. In moderate environment, the lowest environmental simulation constant is 78%, and the highest interest simulation constant is 91%.

The weighted calculation by the third-party analysis software shows that, under the simple environment, the interest simulation constant of the traditional teaching method is 63%; under the moderate environment, the interest simulation constant of the traditional teaching method is 41%; and under the difficult environment, the interest simulation constant of the traditional teaching method is 35% and the average interest simulation constant is 46.3%. Then it is considered that the interest simulation constant of traditional teaching methods is 46.3%. In a simple environment, this paper proposes that the interest simulation constant of applied teaching methods is 96%. In a moderate environment, this paper proposes that the interest simulation constant of applied teaching methods is 93%. In a difficult environment, this paper proposes that the interest simulation constant of applied teaching methods is 90%, and the arithmetic weighted analysis takes the average interest simulation constant as 93%. Then it is considered that the interest simulation constant of the applied teaching method proposed in this paper is 93%. It is concluded that the application of internal medicine nursing teaching in colleges and universities is done using more traditional teaching methods, which improves students' interest in internal medicine nursing courses by 46.7%, and promotes students' continuous learning.

4.3. Educational Diversity Simulation Experiment. Similarly, the data of 6000 students are quantified to construct different learning ability parameter values, with the unit of d. From 0 to 1.0 d, similarly, 0.1d to 0.2 d are class A students, 0.3 d to 0.4 d are class B students, 0.5 d to 0.6 d are class C students, 0.7 d to 0.8 d are class *D* students, and 0.9 d to 1.0 d are class *E* students. According to different types of students and different learning abilities, educational diversity simulation experiments are carried out in three environments: simple, moderate, and difficult. The teaching diversity index is used as the experimental measurement standard. Its teaching diversity index includes the richness of teaching resources, the ways students obtain knowledge points, and teachers' teaching methods. The richness of the three teaching resources, the ways students obtain knowledge points, and teachers' teaching methods are quantified to judge the size of teaching diversity. It is the teaching

diversity index, in %. At the same time, due to the different abilities of students, the acceptable diversity index is also different, so the comparison curve of educational diversity simulation experiment results is obtained. At the same time, the same personnel and the same quantitative mechanism are used to build the same learning ability as the abscissa. The experiment is simple, moderate, and difficult. The experimental results are recorded in the comparison curve of educational diversity simulation experiment results. The comparison curve of educational diversity simulation experiment results is shown in Figure 6. During the experiment, the same as above, the third-party analysis and recording software is used to record and analyze the experimental process and results, and the results are displayed in the comparison result curve of this experiment. The analysis function is used to eliminate the uncertainty caused by the operation of simulation laboratory personnel and simulation computer equipment. The educational diversity simulation experiment is carried out only for different educational and teaching methods and different experimental objects.

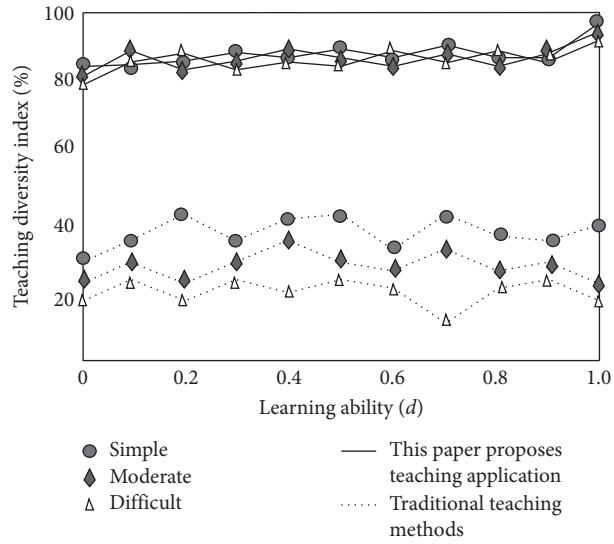

Figure 6: Comparison curve of simulation experiment results of educational diversity.

By analyzing the comparison curve of the simulation experiment results of educational diversity in Figure 6, it is concluded that the teaching application method proposed in this paper has significantly improved the educational diversity as a whole and made outstanding progress in different stages compared with the traditional teaching method. Under the simple experimental environment, students with different learning abilities received different diversity indexes and showed volatility. When the learning ability increases from 0 to 0.2 d, the diversity index increases linearly, which means that the teaching diversity of class A students increases briefly under the traditional teaching methods, and the highest teaching diversity index is 42%. When the learning ability is from 0.2 d to 0.3 d, the teaching diversity index tends to decline. When the learning ability is from 0.3 d to 0.5 d, the teaching diversity index increases rapidly, and its teaching diversity index is 42%. At the same time, it decreases rapidly and improves rapidly. Under the traditional teaching methods, the diversity of students with different learning abilities is low, up to 42%. When the experimental environment is moderate, the change of teaching diversity index curve is similar to that of simple environment, both of which have uncertainty and volatility. The highest teaching diversity index is no more than 38%, which appears when the learning ability is 0.5 d and 0.7 d, respectively, representing class C and class *D* students with moderate learning ability. Students with poor learning ability and high learning ability perform mediocrely in the teaching diversity index under the traditional teaching methods. When the simulation experiment environment is difficult, the teaching diversity curve of traditional teaching methods moves down as a whole, with the highest teaching diversity index of 28% and the lowest teaching diversity index of 12%. Under the three simulation experiment environments, the separation of the three curves is obvious and the overall span is large, indicating that the teaching diversity of traditional teaching methods is poor. For example, when the learning ability is 0.2 d, the educational diversity index is 42% in simple simulation environment, 25% in moderate simulation environment, and 20% in difficult simulation environment. When the learning ability is 0.7 d, the educational diversity index is 42% in simple simulation environment, 27% in moderate simulation environment, and 12% in difficult simulation environment. It shows that traditional educational methods are not suitable for diversity teaching in difficult environment.

In this paper, the teaching application method is proposed. Under the condition of simple simulation experiment, the change range of teaching diversity index curve is unknown and tends to a straight line. The lowest teaching diversity index appears when the learning ability is 0.6 d, and the teaching diversity index is 85%; the highest teaching diversity index appears when the learning ability is 1.0 d, and the teaching diversity index is 95%; and the average change of teaching diversity index is 85% to 90%. In the moderate simulation environment, this paper puts forward the teaching application method, teaching diversity index, and the curve change which is basically the same as that in the simple simulation environment. The lowest teaching diversity index appears when the learning ability is 0.2 d, 0.6 d, and 0.8 d, and the teaching diversity index is 82%; the highest teaching diversity index appears when the learning ability is 1.0 d, and the teaching diversity index is 92%; and the average change of teaching diversity index is 82% to 90%. The lowest point of teaching diversity index appears in multiple positions, which shows that the teaching application method proposed in this paper changes gently in a moderate environment. In the difficult simulation environment, this paper puts forward the teaching application method and the teaching diversity index, which is basically similar to the change curve under the simple and moderate simulation experimental environment. The lowest teaching diversity index appears when the learning ability is 0.3 d, and the teaching diversity index is 81%; the highest teaching diversity index appears when the learning ability is 1.0 d, and the teaching diversity index is 90%, and the average change

of teaching diversity index is between 80% and 90%. Under different simulated experimental environments, the three curves are intertwined. The overall change of the curve is stable, which shows that the teaching application method proposed in this paper has a good embodiment in teaching diversity and can provide diverse teaching modes for students with different learning abilities, improving their learning ability and academic performance.

The weighted calculation by the third-party analysis software shows that in a simple environment, the teaching diversity index is 36%; in a moderate environment, the teaching diversity index is 29%; in a difficult environment, the teaching diversity index is 22%; and the arithmetic weighted analysis takes the average teaching diversity index as 29%; then, it is considered that the teaching diversity index of traditional teaching methods is 29%. In a simple environment, this paper proposes that the teaching diversity index of applied teaching methods is 84%. In a moderate environment, this paper proposes that the teaching diversity index of applied teaching methods is 83%. In a difficult environment, this paper proposes that the teaching diversity index of applied teaching methods is 84%, and the average teaching diversity index is 83.67%. Then it is considered that the teaching diversity index of applied teaching methods proposed in this paper is 83.67%. It is concluded that the application of internal medicine nursing teaching in colleges and universities is 54.67% higher than the traditional teaching methods.

5. Conclusion

This paper puts forward the application analysis of two-dimensional code online testing technology in nursing teaching in colleges and universities. Through the difficulties of nursing teaching in higher vocational colleges and the construction of multiplatform information-based teaching system, relying on multiplatform information-based teaching system, we can promote students' interest in internal medicine nursing. Relying on different types of evaluation of students, carry out diversified teaching and targeted assignment. At the same time, use the multiplatform information-based teaching supervision system to prevent students from skipping classes and not completing their homework on time. Establish different types of learning groups, and construct the communication mechanism with in-service internal medicine nurses, so as to improve the teaching level of internal medicine nursing in higher vocational colleges and realize the research of this paper. The experimental data show that the method designed in this paper is highly effective.

There are still improvements in the actual operation process, which are discussed and analyzed as follows:

(1) The quality of nursing teaching video in QR code is difficult to guarantee. The video recording must be carried out in the daily working environment to make students feel more situational. The operators must move smoothly and be standardized; the commentators must enunciate clearly, use standard terms, and focus on interpretation of key contents, and each video recording shall be simplified as much as possible and controlled within about 5 min. The produced video must be sent to the teaching department or nursing department of the hospital for review before use.

(2) Teachers tend to weaken their teaching dominance over students. The application of QR code online testing technology is a teaching mode dominated by students' autonomous learning and teachers. Teachers play an important role in supervising and guiding students' learning process, which can be further studied in the future.

Data Availability

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Conflicts of Interest

The authors declared that they have no conflicts of interest regarding this work.

Acknowledgments

This work was supported by the Ministry of Education Industry-University Collaborative Education Program, the construction of mixed "golden Course" of Midwifery based on super Star "One level and three End" intelligent teaching system; Research on the construction of "Golden Course" in colleges and universities under the mode of cross-school and cross-regional collaborative development by integrating information technology—Taking western local universities as an example; Higher Education Innovation Fund Project of Gansu Provincial Education Department; Research on the Construction of Reproductive Healt h Model for College Students in Gansu Province under the Internet + Environment (GS[2019]GHBZ137); key project of the "13th Five-Year" Education Science Plan of Gansu Province in 2019; Hexi University Teaching Research Project (no. Hxxyjy-2020-49); Exploration and practice of creating high-quality resource sharing "Golden Course" with information technology in nursing teaching—taking obstetrics and gynecology nursing as an example; and the First-Class Undergraduate Course of Hexi University, Obstetrics and Gynecology Nursing.

References

[1] B. L. Reedy, P. R. Philips, and D. J. Newell, "Nurses and nursing in primary medical care in England," *British Medical Journal*, vol. 2, no. 6047, pp. 1304–1306, 2019.

[2] K. T. Unroe, E. Mary, and C. John, "The IOM report on dying in America: a call to action for nursing homes," *Journal of the American Medical Directors Association*, vol. 16, no. 2, pp. 90–92, 2015.

[3] N. Listed, "Medicare program; schedule of limits for skilled nursing facility inpatient routine service costs--HCFA. Final

notice with comment period," *Federal Register*, vol. 56, no. 62, Article ID 46177, 2019.

[4] A. A. Mwakanyamale, A. M. A. Mukaja, M. Ndomondo, A M A. Mukaja, and J P. Zenas, "Nursing practice on post-operative wound care in surgical wards at muhimbili national hospital, dar-es-salaam, Tanzania," *Open Journal of Nursing*, vol. 9, no. 8, pp. 870–890, 2019.

[5] S. Perkisas, C. Amd, M. Vandewoude, and V. Verhoeven, "Prevalence of sarcopenia and 9-year mortality in nursing home residents," *Aging Clinical and Experimental Research*, vol. 31, no. 7, pp. 951–959, 2019.

[6] N. Mcclure and C. Brame, "Asthma medications: a think-pair-share-square activity for nursing students," *Nurse Educator*, vol. 45, no. 1, p. 16, 2020.

[7] B. Burford, P. Greig, M. Kelleher et al., "Effects of a single interprofessional simulation session on medical and nursing students' attitudes toward interprofessional learning and professional identity: a questionnaire study," *BMC Medical Education*, vol. 20, no. 1, pp. 1–11, 2020.

[8] F. T. Li and S. Seetharaman, "Preventing the spread of COVID-19 to nursing homes: experience from a Singapore geriatric centre," *Journal of the American Geriatrics Society*, vol. 68, no. 5, pp. 942–950, 2020.

[9] M. Zhou, J. Hu, and Q. Wang, "Design of semi-open intelligent access control system based on QR code," *Microcontrollers & Embedded Systems*, vol. 20, no. 10, pp. 50-51+55, 2020.

[10] L. Cong, W. He, and N. A. University, "Design of transfer management system based on QR code," *Microcontrollers & Embedded Systems*, vol. 20, no. 7, pp. 43–46, 2020.

[11] K. Latha and T. Sheela, "Security scheme in cloud system using hyper elliptic curve and SIFT technique with QR code," *Wireless Personal Communications*, vol. 111, no. 2, pp. 1327–1340, 2020.

[12] J. Qian, B. Xing, B. Zhang, and H. Yang, "Optimizing QR code readability for curved agro-food packages using response surface methodology to improve mobile phone-based traceability," *Food Packaging and Shelf Life*, vol. 28, no. 1, Article ID 100638, 2021.

[13] S. Zhang, J. Liao, S. Wu, J. Zhong, and X. Xue, "A traceability public service cloud platform incorporating IDcode system and colorful QR code technology for important product," *Mathematical Problems in Engineering*, vol. 2021, Article ID 5535535, 15 pages, 2021.

[14] D.-C. Wu and Y.-M. Wu, "Covert communication via the QR code image by a data hiding technique based on module shape adjustments," *IEEE Open Journal of the Computer Society*, vol. 1, no. 4, pp. 12–34, 2020.

[15] C. M. Santostefano, E. M. White, R. A. Feifer, and V. Mor, "Accuracy of ICD-10 codes for identifying skilled nursing facility residents with lab-confirmed COVID-19," *Journal of the American Geriatrics Society*, vol. 10, no. 8, pp. 45–53, 2021.

[16] C. A. Hossler, "Competency-based nursing: reducing cost while maintaining or improving quality," *Journal of Competency-Based Education*, vol. 6, no. 1, pp. 1–15, 2021.

[17] V. M. Boscart, S. Sidani, J. Ploeg et al., "Neighbourhood Team Development to promote resident centred approaches in nursing homes: a protocol for a multi component intervention," *BMC Health Services Research*, vol. 19, no. 1, pp. 1–7, 2019.

[18] M. Musabwasoni, M. Kerr, Y. Babenko-Mould, M. Nzayirambaho, and A. Ngabonzima, "Assessing the impact of mentorship on nurses' and midwives' knowledge and self-efficacy in managing postpartum hemorrhage," *International Journal of Nursing Education Scholarship*, vol. 17, no. 1, pp. 98–106, 2020.

[19] S. Zhang, Y. Bai, and L. Liu, "Value evaluation of application of mu class teaching in clinical nursing teaching," *The Science Education Article Collects*, vol. 481, no. 1, pp. 100–102, 2020.

[20] R. . Zou, "Effect analysis of multimedia on improving interest of students in obstetrics and Gynecology nursing teaching," *Smart Healthcare*, vol. 6, no. 3, pp. 27-28, 2020.

[21] Y. Zhang, D. Zou, Y. Zhang, and X. Wang, "Accurate application of "Hand as Foot" in nursing teaching," *Asian Journal of Surgery*, vol. 44, no. 9, pp. 1232-1233, 2021.

[22] D. R. Hanna, "Proposing standards for teaching authentic nursing knowledge," *Advances in Nursing Science*, vol. 43, no. 1, pp. 42–49, 2020.

[23] L. Dumas and F. d. Montigny, "Quality perinatal nursing education through coteaching," *The Journal of Perinatal Education*, vol. 8, no. 4, pp. 27–35, 2020.

[24] H. Ma, "For the love of nursing. and teaching!" *Journal of Christian Nursing*, vol. 37, no. 4, pp. 251–260, 2020.

[25] L. J. Labrague, D. M. McEnroe-Petitte, M. S. D'Souza, K. S. Hammad, and J. N. A. Hayudini, "Nursing faculty teaching characteristics as perceived by nursing students: an integrative review," *Scandinavian Journal of Caring Sciences*, vol. 34, no. 1, pp. 23–33, 2020.

[26] F. F. Lv, H. He, and H. M. Bi, "Application of "Internet+" question-based teaching mode in theteaching of characteristic nursing of Dai medicine," *TMR integrated care*, vol. 004, no. 2, pp. 45–49, 2020.

[27] X. Gao, "Application of inquiry learning in nursing teaching of cardiac surgery operating room," *Health Horizon*, no. 11, pp. 45–49, 2019.

[28] K. A. Kalb and S. O'Conner-Von, "Holistic nursing education: teaching in a holistic way," *Nursing Education Perspectives*, vol. 40, no. 3, pp. 162–164, 2019.

[29] K. F. Phillips, L. Mathew, N. Aktan, and P. Sandanapitchai, "The effectiveness of shared clinical teaching in nursing," *International Journal of Nursing Science*, vol. 10, no. 4, pp. 211–215, 2019.

[30] D. Lillekroken, "Teaching basic nursing care: nurse preceptors' perceptions about changing the teaching context from the clinical setting to a school simulation lab," *Nephron Clinical Practice*, vol. 16, no. 1, pp. 60–135, 2019.

[31] K. Wang and F. Qian, "Clinical application analysis of nursing teaching ward round in ICU teaching," *China Continuing Medical Education*, vol. 12, no. 9, pp. 54-55, 2020.

[32] J. Pellet, M. Weiss, J. Rapin, C. Jaques, and C. Mabire, "Nursing discharge teaching for hospitalized older people: a rapid realist review," *Journal of Advanced Nursing*, vol. 76, no. 11, pp. 2885–2896, 2020.

[33] G. Basit and F. Korkmaz, "The effect of web-based nursing process teaching on senior nursing students' care planning skills#," *International Journal of Nursing Knowledge*, vol. 32, no. 2, pp. 1–16, 2020.

[34] D. Mcenroe-Petitte and C. Farris, "Using gaming as an active teaching strategy in nursing education," *Teaching and Learning in Nursing*, vol. 15, no. 1, pp. 61–65, 2020.

[35] Y. Zolkefli, "The use of debate in teaching nursing ethics," *Teaching and Learning in Nursing*, vol. 4, no. 10, pp. 365–367, 2021.

[36] E. J. B. Thrower, R. Fay, L. Cole et al., "A systematic process for evaluating teaching methods in nursing education," *Nurse Educator*, vol. 45, no. 5, pp. 257–260, 2020.