

Evaluation and Analysis of the Effect of Introducing Virtual Simulation Experiment into Nursing Skills Teaching

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Abstract: In order to verify the teaching effect of nursing skills, this paper proposes to optimize the evaluation and analysis method of the effect of introducing virtual simulation experiments into nursing skills teaching. Firstly, the teaching information in the virtual teaching environment is collected and classified. According to the information classification results, different levels of teaching quality evaluation algorithms are respectively set up. In order to ensure the accuracy of evaluation, the detection parameters and evaluation rules are standardized. Finally, the effective evaluation of the effect of introducing virtual simulation experiment into nursing skill teaching is realized. Finally, the experimental investigation proves that the effect evaluation of introducing virtual simulation experiment into nursing skill teaching is obviously better than the traditional evaluation method.

Keywords: Nursing skills; Virtual simulation; Effectiveness evaluation

1. Introduction

With the increasing demands of the people for health level and medical quality, the construction of high-quality clinical medical team is the key to improve the level of health services. Nursing is a science that needs to be accumulated and comprehended in practice. College education is only the basic education for the introduction of nursing, and a lifelong nursing education system including post-graduation nursing education and continuing nursing education needs to be established[1]. Virtual simulation is an important method in nursing practice. Only the nursing education on university campus is not the real nursing education. Without the teaching of nursing skills, the whole process of nursing education cannot be completed, let alone the training of high-quality nursing talents. With the development of the world economy, nursing education is facing the challenge of internationalization. China should speed up the process of internationalization of nursing education, approach or converge to international standards in the concept, mode and quality standards of nursing personnel training, and train high-level and high-quality nursing personnel with international competitiveness. This also puts forward higher requirements for nursing skill teaching, a special component of nursing education[2]. With the rapid development of nursing science and technology, and with the increasing demands of the people on health level and medical quality, the key to improving the level of health service in China is to build a high-quality clinical medical team and continuously improve the level and

quality of medical technology[3]. The number of medical professional nurses per thousand population in China has risen from the early days of the founding of the People's Republic of China to more than the world average. However, the structure of this team is unreasonable and the level is low[4]. The medical profession is a profession that requires lifelong learning. Nursing is a science that needs to be accumulated and comprehended in practice. College education is only the basic education for the introduction of nursing, and a nursing education system including post-graduation nursing education and continuing nursing education needs to be established. Since the reform and opening up, China's nursing education has developed unprecedentedly and achieved remarkable results in personnel training, scientific research and improvement of medical service level. However, it must be admitted that there is still a gap between the level of nursing education in China and that in developed countries. Our country should speed up the process of internationalization of nursing education. In terms of the concept, mode and quality standard of nursing personnel training, we should approach or converge to the international standard and train high-level and high-quality nursing personnel with international competitiveness. This also puts forward higher requirements for the teaching of nursing skills, a special component of nursing education. Under this background, a method for evaluating the effect of introducing virtual simulation experiment into nursing skill teaching is proposed in order to promote the development and reform of nursing science.

2. Evaluation of the Effect of Introducing Virtual Simulation Experiment into Science and Technology Teaching

2.1. Nursing teaching information collection based on virtual simulation

Nursing education is to train nursing talents to serve medical and health undertakings and socialist modernization. Practicality is an important characteristic of nursing education. The whole process of nursing education information includes: college education information, post-graduation education information and continuing nursing education information. Among them, the basic nursing education information refers to the general and specialized nursing education in the school of nursing, which has a wide range of specialties and is mainly characterized by imparting basic knowledge information (basic theory information, basic knowledge information and basic skill information) [5]. It is the elementary education, basic education and quality education of nursing and lays the foundation for becoming a doctor in the future. Generally, it includes basic nursing education and clinical nursing education. Post-graduation nursing education refers to an educational process in which

graduates who have completed basic education in higher medical schools receive standardized systematic professional training in a certain discipline, so as to gradually deepen their knowledge and skills towards a certain professional direction. It is a unique stage of nursing education. The training method of combination of rotation and orientation training is adopted, with emphasis on strengthening the ability training[6]. Continuing nursing education information refers to the education of health technicians with intermediate and above professional and technical positions based on learning new theories, new knowledge, new methods and new technologies after graduation, which is flexible and diversified in form, enabling health technicians to keep pace with the development of nursing science, continuously improve their technical level and run through their entire career[7]. Therefore, in order to ensure that students have a solid grasp of nursing skills, a teaching mode of nursing skills is proposed in the virtual simulation environment. Through the simulation of human body and nursing environment, nursing students can be helped to have a deeper and real grasp of the working environment and various problems they may face in their work. Nursing teaching is carried out in a virtual simulation environment and teaching data are collected. The specific principles are as follows.

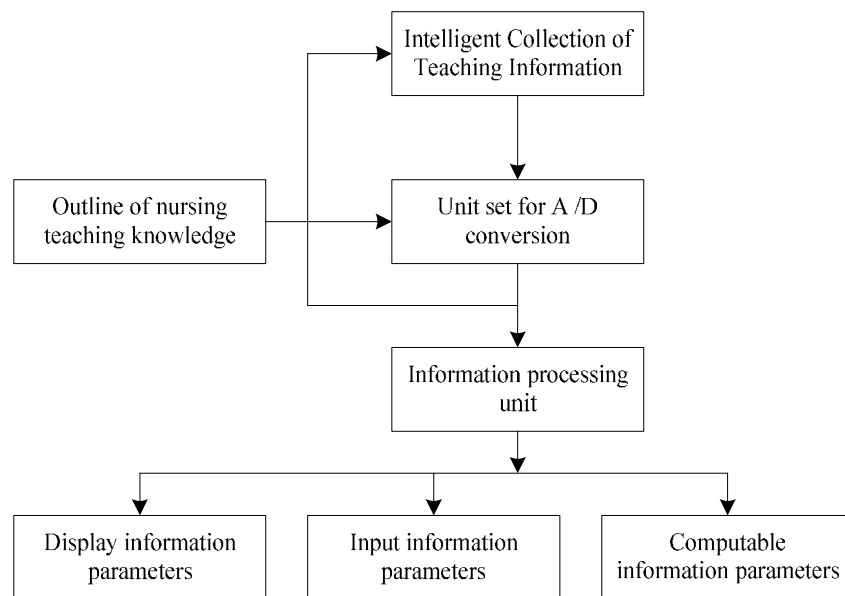


Figure 1. Collection of nursing teaching data

Based on the principle of collecting nursing teaching data, the education evaluation methods proposed by relevant experts and scholars at home and abroad are studied. Among many teaching effect evaluation models, the model level is the clearest[7]. It includes: system level,

entity organization level and individual level, and multiple levels are nested in turn. Evaluation at entity level and individual level must be carried out within the framework of system level.

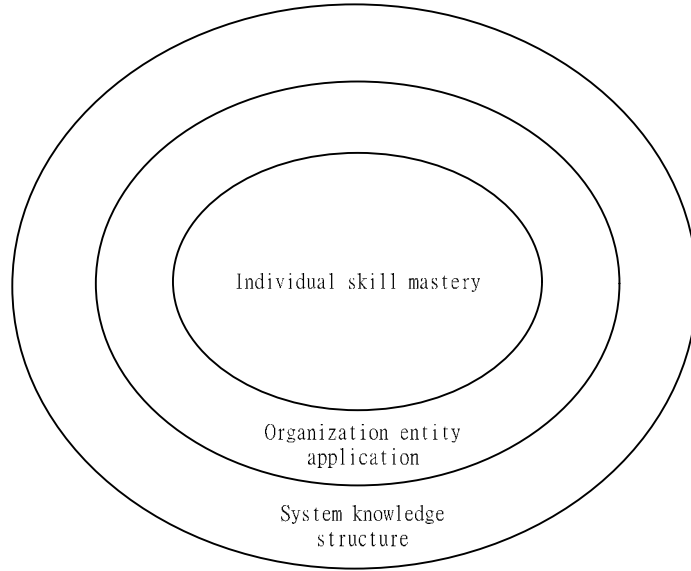


Figure 2. Capacity concept evaluation dimension model

The three levels of capability evaluation dimension information distribution in the capability concept evaluation dimension model are collected and divided, and the specific purpose contained in the information should be followed in the collection process[8]. In addition, it should also include the values, norms and standards of all entities and organizations in the quality system; Under this theory, the evaluation of the teaching effect of virtual simulation nursing skills was guided and provided reference.

2.2. Teaching quality evaluation algorithm

Due to the complexity of the constituent factors of nursing skill teaching ability, it is difficult to define and define the standard values of some indexes[9]. therefore, when comparing data, dynamic trends or relative values are often used to simplify the evaluation process. for the design of nursing skill teaching quality organization under the virtual simulation environment, Euler's algorithm should be followed and the quality program should be set as $k(l)$ In the teaching process l_n Derivative at $k'(l_n)$. Use the two-point formula instead, i.e.

$$k'(l_n) = \frac{k(l_{n+1}) - k(l_n)}{h} \quad (1)$$

Then use Kn to replace it approximately $k(l_n)$. Then the initial value problem becomes

$$\begin{cases} k_{n+1} = k_n + hf(l_n + k_n) \\ k_0 = k(l_0), n = 0, 1, 2 \end{cases} \quad (2)$$

From the aspect of teaching content design, Euler is used to solve the initial value problem of the design to obtain the design of teaching quality evaluation method[10].

On this basis, in order to improve the accuracy of information collection, a depth-based learning algorithm is proposed, which is a typical generative depth structure. A depth belief network is set up with a total of I hidden layers. Let h^n represents the nth hidden layer vector, then the deep belief network model can be expressed as:

$$p(q, h^1, h^2, \dots, h^I) = \sum_{k_{n+1}} (q|h^1)(h^1|h^2) \dots p(h^{I-1}|h^I) \quad (3)$$

Conditional probability $p(h^n|h^{n+1})$ can be expressed as:

$$p(h^n|h^{n+1}) = \varphi \left(-a_m^n - \sum_{k=1}^{n+1} w_{km}^n h_k^{n+1} \right) \quad (4)$$

Where: a_m^n represents the m-th node of the n-th layer, w^n A weight matrix representing the n-th layer, φ can be expressed as:

$$\varphi(q) = k'(l_n) \frac{1}{1 + \exp(-q)} \quad (5)$$

Based on the above steps, the calculation of the quality evaluation rules can improve the accurate performance of the evaluation and further ensure the authenticity and effectiveness of the evaluation results of the teaching effect. The evaluation algorithm is further optimized and verified, and the verification steps are as follows: set up I the set of all relation matrices R_{xy} ; $v \in \{1, 2, \dots, \max_x t_x\}$; p_q the characteristic set of a matrix, wherein $q \in \{1, \dots, r\}$; A, B Factor matrix. Then: Then, the steps of initializing B_x are as follows Construct matrices c and d .

set up $E = \varphi(q)(B^T B)^{-1} B^T C B^{-1}$, B_x^c matrix set to 0, B_x^d matrix set to 0.

For each relational matrix C_{xy} do the following:

$$B_x^e = (C_{xy} B_y E_{xy}^T)^+ + B_x (E_{xy} B_y^T B_y E_{xy}^T)^- \quad (6)$$

$$B_x^d = (C_{xy} B_y E_{xy}^T)^- + B_x (E_{xy} B_y^T B_y E_{xy}^T)^+ \quad (7)$$

$$B_x^e = (C_{xy}^T B_y E_{xy}^T)^+ + B_x (E_{xy}^T B_y^T B_y E_{xy}^T)^- \quad (8)$$

$$B_x^d = (C_{xy}^T B_y E_{xy}^T)^- + B_x (E_{xy}^T B_y^T B_y E_{xy}^T)^+ \quad (9)$$

The following verification operations can be performed according to the above algorithm: x is from 1 to r , and the following operations are performed:

$$B_x^e = [q_x^-] B_x \quad (10)$$

$$B_x^d = [q_x^+] B_x \quad (11)$$

The value range algorithm for constructing matrix B is as follows:

$$B = B \circ \text{Diag} \left(\sqrt{\frac{B_1^e}{B_1^d}}, \sqrt{\frac{B_2^e}{B_2^d}}, \dots, \sqrt{\frac{B_r^e}{B_r^d}} \right) \quad (12)$$

The above algorithm can effectively complete the detection of nursing teaching effect under the virtual simulation environment, and can effectively calculate and evaluate the teaching quality parameters according to the above algorithm.

2.3. Implementation of teaching effect evaluation of nursing skills

Combined with the above algorithm, the teaching method of nursing skills in the virtual simulation experiment environment was optimized. According to the principle of hierarchical analysis, the nature and grades of potential and actual related teaching marketing factors in the virtual simulation nursing teaching process are subordinated and arranged. the simplest detection

arrangement mode can be divided into three layers, and the specific structure is shown in Figure 3.

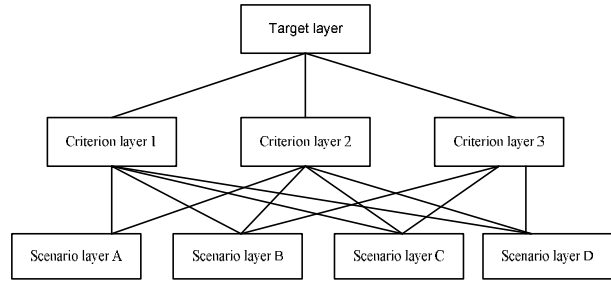


Figure 3. Principle of hierarchical analysis of teaching quality

In the above structure, the top layer is the target layer, which is the synthesis of the system's goals or problems. The middle layer is the criterion layer, in which various criteria or elements of problems to measure whether the target is reached are arranged; The third layer is the scheme layer, in which various possible schemes are arranged. The connection line in the figure indicates that there is a connection between the upper and lower factors, otherwise there is no connection. Hierarchical single sorting is to convert the judgment matrix into the weight vector of the corresponding elements (i.e. to find the weight). In addition, due to the complexity of objective things, the diversity of people's understanding and the possible one-sidedness, the judgment matrix may be inconsistent. In order to ensure the rationalization of the conclusion obtained by analytic hierarchy process analysis, it is necessary to check the consistency of the judgment matrix. Therefore, the teaching quality evaluation content and standard parameters are standardized in combination with the rule layer rules.

Table 1. Contents and standard parameters of teaching quality assessment

C1	Teaching consciousness	Teaching condition	Teaching management	Teaching status	Teaching results
Teaching consciousness	1-1	1-7	1-5	1-1	1-5
Teaching condition	6-1	3-7	3-5	1-1	3-5
Teaching management	5-1	4-7	1-5	4-1	2-5
Teaching status	1-1	3-7	2-5	4-1	3-5
Teaching results	4-1	5-7	1-5	5-1	2-5

The virtual simulation nursing teaching quality was evaluated under the above teaching quality evaluation content and standard parameter environment, and the evaluation results were tested several times combined with the previous algorithm, so as to ensure the effectiveness and accuracy of the effect evaluation. Due to the complexity of the factors constituting the teaching ability of nursing skills, the standard values of some indexes are difficult to be clearly defined and defined. Therefore, there are still certain fluctuation values between the evaluation results and the actual results of

this method, but the calculation shows that the fluctuation value is between 2% and 3.7%, which is relatively small and will not affect the evaluation process, so it can be ignored in the evaluation process. At this point, the effective evaluation of the effect of nursing teaching skills under the virtual simulation experiment environment has been completed.

3. Analysis of Experimental Results

A total of 100 students from two classes of the course "Skills Training Teaching and Research Section and Nursing Comprehensive Training" in a medical college were selected as the research subjects, all of whom were women, with an average age of about 19 to 21 years old, and were arranged in the first half of the fourth semester. At this time, the students basically mastered nursing knowledge, nursing knowledge, internal and external, and theoretical knowledge of women and children nursing and other specialties. The nursing students were randomly divided into experimental group and control group, with 50 students in each group. The class hours for practical training are the same, and the teaching contents are the same, and the evaluation criteria for practical training are also the same. The control group adopted the conventional comprehensive training mode, and the specific operation flow is as follows: watching videos through multimedia equipment, demonstrating by nursing teachers, starting

grouping exercises for students, mastering skills, and examining and evaluating clinical teachers.

The experimental group adopted a virtual simulation scenario simulation training mode. The operation items were divided into 16 items and completed within 30 class hours. The virtual simulation scenario simulation training teaching was conducted 3 times with 5 class hours each time, and the place was arranged in the simulated hospital ward for class. The specific operation process is as follows: teachers provide real cases and inform students to prepare; After receiving the notice, the students will discuss in groups. 50 students are divided into 5 groups, 10 students in each group; According to the content of the case, carry out data inquiry and make nursing plans. Exercises in simulated wards; Clinical teachers are assessed and evaluated.

According to the above experimental contents, the results of nursing skills examination of nursing students in the control group and the experimental group were compared. The specific comparison is shown in Table 1.

TABLE 2. Comparison results of examination results between control and experimental groups

Comparison object	Number of experiments	Theoretical results	Results of practical training courses
Control group	50	83.50±10.00	80.00±8.00
Experimental group	50	86.00±5.00	89.00±5.00
Comparison of group counting data		0.950	3.145
The significance of statistics	-	0.469	0.003

It can be seen from the table that the virtual simulation scenario simulation training mode adopted by the experimental group is superior to the conventional comprehensive training mode adopted by the control group in terms of both theoretical course results and training course results. On this basis, the teaching effect of nursing skills in the virtual simulation environment was evaluated and tested. The test results are as follows:

effectiveness of the evaluation of nursing skills teaching effect in the virtual simulation environment proposed in this paper is obviously better than the traditional detection results. Fully meet the research requirements. In addition, the experimental investigation shows that students' achievement is closely related to each nursing skill and the effect of virtual simulation teaching. In the process of teaching, we need to continuously carry out virtual simulation practice to explore and reflect on whether the teaching content is suitable for every student, and constantly improve our teaching level and scientific research ability in the process, so as to provide a good teaching environment for nursing students, make greater progress in the reform of nursing skills curriculum in our school, and also provide more excellent talents for nursing specialty in our country.

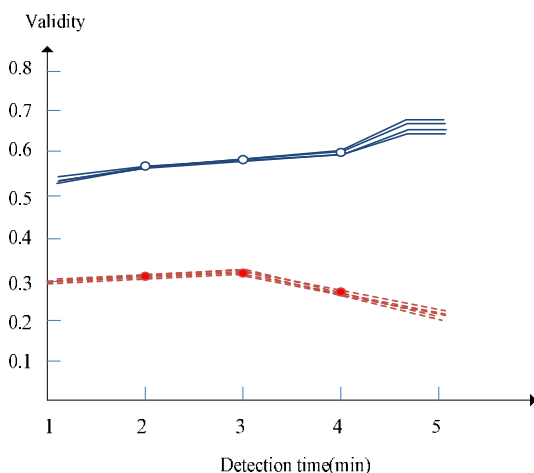


Figure 4. Comparison test results

Looking at the above figure, it is not difficult to find that compared with the traditional evaluation results, the

4. Concluding Remarks

In order to better grasp and understand the application effect of virtual simulation experiment in nursing teaching, the optimal design of its teaching effect evaluation method is proposed. Under the condition of virtual reproduction of nursing environment, the actual learning effect of nursing students was tracked and investigated. The investigation shows that the effect evaluation and analysis results of introducing virtual simulation experiments in nursing skills teaching are obviously optimized compared with the traditional

analysis results, which fully meet the research requirements.

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- 4.Zhengzhou sias university key professional support project (201711)
- 5.University-level teaching team support project of zhengzhou sias university (201624)

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