

"Surgical Nursing" Curriculum Reform based on Online-offline Dual-teaching Model

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Abstract—Surgical Nursing is the major course for nursing specialty, which also manifests the key teaching stage for cultivating nursing professional talents. Therefore, its teaching quality directly influences the competency and quality of nursing talent cultivation. However, surgical nursing education is still focused on knowledge instruction and neglect ability training. Due to numerous teaching content and tense class time, students often feel it difficult to understand and master during their study. The continuous updating of modern teaching approaches has mobilized the constant innovation of teaching methods of surgical nursing. In this study, an online-offline dual-teaching model based on universal learning concept is firstly proposed, including three types of courses: summary and promotion curriculum, parallel curriculum, and heuristic curriculum. Next, a virtual surgical nursing scenario is created by virtue of modern education technology to establish a virtual-real integrated scenario-based learning activity strategy. Then, by means of improved expert scoring, the intuitionistic fuzziness in evaluation object indexes is proposed to generate the required intuitionistic fuzzy number. Finally, an intuitionistic fuzzy comprehensive evaluation of the dual-teaching model constructed in this research is performed. The teaching results show that this teaching model can stimulate students' creative learning thinking. Teachers can make the best of advantage of online-offline combined model to carry out precise and individualized teaching. In addition, it is feasible to realize precise student-student interaction by virtue of accurate big data analysis, thereby greatly enhancing teaching effect.

Keywords—Virtual reality, Dual-teaching, Surgical nursing, Intuitionistic fuzzy evaluation

1 Introduction

The "Internet +" era has facilitated the in-depth integration of information technology with education and teaching, and advocated the interaction between students and teachers, students and students, and students and teaching activities, realized knowledge sharing and creation by everyone. However, the current market has set higher requirements for nursing talents, who need to own a solid theoretical foundation and practical skills, but also possess strong self-learning capabilities and compre-

hensive clinical application competence. This requires to cultivate students in a scientific, planned and systematic manner during their school period [1]. However, in face of numerous knowledge points in surgical nursing, it is difficult to mobilize students' initiative and enthusiasm in learning if teachers only conduct theoretical teaching step by step by traditional means. This will hinder the cultivation of students' interest in learning, and the cultivation of post competence [2]. In the meantime, with the outbreak of COVID-19, colleges and universities have postponed the time of new term to protect the life security of teachers and students. However, in order not to affect students' academic study, colleges and universities adopt various online teaching platforms to provide individualized online courses. However, some teachers without adequate understanding of online-offline teaching approaches lack interaction with students during teaching and lack sufficient data information. In this case, the superiority of online-offline dual-teaching interactive teaching model cannot be manifested. Under this background, the dual-teaching method based on new media technology is established. Exploring and applying effective teaching methods will be of great significance for enhancing the quality of surgical nursing teaching.

Online teaching model has increasingly become a hot spot in the education field for its significant role in case-based teaching, educational resource integration and sharing, online big data analysis evaluation, and real-time demand-based autonomous learning. However, due to the uneven quality of online teaching, and a lack of scientific evaluation of the effect of the teaching model, an effective evaluation index system has not yet been established. Therefore, in this study, a three-segment cycle model based on online and offline dual-teaching is innovatively proposed and applied in surgical nursing teaching. In the meantime, a new teaching concept based on UDL is applied to design an individualized way of participation, to create a learning environment, and inspire students to devote themselves to learning. By virtue of modern education technology, a virtual surgical nursing scenario is created and a virtual-real integrated scenario-based learning activity strategy is established. Then, by applying the improved intuitionistic fuzzy number evaluation method, the effect of the teaching model constructed in this research is evaluated, in hope of providing a new perspective and reform idea for other nursing teaching.

2 State of the art

“Surgical Nursing”, as the main core course of nursing specialty, is tremendous and complex in its knowledge system and integral as a whole, closely correlated with the previous courses, covering a wide range. Studies have indicated that nursing teaching is still carried out by traditional lecturing. Most teachers regard themselves as the main principal part of the classroom and neglect students' subject status, which cannot reflect students' initiative. Therefore, how to change the teaching status of nursing curriculum, help students understand and internalize knowledge, and enhance teaching effect deserve nursing teachers' in-depth exploration. Day-Black et al. [3] proposed Nursing faculty at a mid-Atlantic Historical Black College and University introduced "serious gaming" technology into a Community Health Nursing course by

using two web-based gamed simulations, *Outbreak at WatersEdge: A Public Health Discovery Game*, and *EnviroRisk*. This innovation proved to be effective in reinforcing learning and improving student learning outcomes. Parker & Myrick [4] attempted to adopt high-fidelity human simulator as a teaching tool in nursing. From this simulator, the students can build several scenarios of specific nursing procedures for the Intensive Care Unit (ICU) in order to be efficiently used in the teaching- learning process. Practice shows that the adoption of this approach can improve the knowledge and operational capabilities of nursing students. Swigart and Liang [5] believe that Open Courseware (OCW) and massive open online courses (MOOCs) can be used in nursing teaching. It is believed after survey that MOOCs, including video lectures, interactive modules, homework, learning materials, discussion boards, quizzes and tests, is an online learning and education tool worth promoting. Experiments also reveal that such reform can benefit nursing students and nursing professional learning, and can supplement classroom teaching.

Currently, traditional teaching model is prevailing in China’s surgical nursing teaching. Despite its own advantages and characteristics, for example, teachers can make full use of the limited time in class to explain the difficulties and key knowledge points to students for a comprehensive and systematic understanding, traditional teaching methods cannot stimulate students’ interest in learning, and it is difficult to cultivate students’ autonomic leaning and independent thinking ability, exploration and problem-solving capabilities, innovative competence and critical thinking. Guo et al. [6] tried to conduct scenario-based simulation teaching in surgical nursing teaching, and created scenarios of surgical clinical nursing work according to teaching requirements. Students played different roles in the scenarios, such as doctors, nurses, patients, family members, and so on. The teacher analysed and guided, summarized a virtual practical training method. The results prove that scenario-based simulation teaching method is a teacher-led and student-based approach that can stimulate students’ independent thinking ability and strengthen teacher-student interaction. However, no objective evaluation standard is available for this teaching mode at present [7]. Some researchers proposed "case teaching method" in surgical nursing teaching, and established a curriculum system containing representative cases, so as to encourage teacher-student two-way discussion, which significantly improved the teaching effect [8]. Zhou et al. [9] set a WeChat-based case teaching method in the curriculum of surgical nursing, and found that this method can improve the teaching effect and promote students’ learning willingness and participation. Luo et al. [10] integrated case teaching method with super star learning APP. It is found that this method can better cultivate students’ autonomous learning habits, enhance classroom teaching effects and students’ satisfaction with the classroom. Zhou & Shi [11] proposed to adopt experiential teaching method in surgical nursing teaching to enhance students’ humanistic caring ability, and to meet clinical needs for nursing talents. This can train students’ thinking mode to solve practical problems, enhance students’ interest in learning, manifest students’ subjectivity, and help students adapt to the requirements of clinical nursing work. To sum up, despite the gradually diversified teaching approaches in recent years, most of them become formalistic within a small application scope, without targeted teaching purpose.

Under the dual-teaching mode, one teacher conducts remote teaching while the other teacher interacts in the classroom simultaneously. Such teaching method will make the teaching process more interesting so that students can accept easily. During the whole teaching process, due to the adoption of distance education, there is no need to worry about students’ omission of knowledge when learning, which means it will be more convenient. So far, this teaching model has been applied in various disciplines such as environmental engineering, biology teaching, physics, linguistics, etc. [12]. However, few reports on dual-teaching model by virtue of online teaching technology in surgical nursing course can be found. In view of this, this paper has innovatively proposed to establish an online-offline dual-teaching model, and created virtual surgical nursing scenarios to establish virtual-real integrated scenario-based learning activity strategy. Finally, by improving intuitionistic fuzzy number method, the dual-teaching teaching constructed in this research is evaluated objectively, in hope of providing an objective reference for nursing teaching to cultivate more qualified nursing talents.

3 Integrate the concept of online-offline dual-teaching model into the animation teaching curriculum

3.1 Application of Universal Design for Learning (UDL) concept in teaching

Considering that UDL teaching principles EW scientific, in order to conform to the theoretical and logical agreement, this study has appropriate modifications and adopted it as the core of the model method components [13]. The teaching principles of improved UDL-based online-offline dual-teaching model include: Principle I, provide individualized representation methods, so that learners can acquire learning content in most suitable manner, including providing precise support for knowledge perception, representation form and understanding; Principle II, provide individualized actions and expressions to help students demonstrated knowledge and skills they have obtained in the most adaptive manner, including providing precise support for physical practice, expression and communication, and executive function; Principle III, provide individualized methods of participation, for the purpose of stimulating students to fully devote to learning, including providing precise support for interest motivation, continuous efforts, persistence and self-regulation. On this basis, UDL-based online-offline dual-teaching model supported by the implementation means of artificial intelligence technology and precision teaching and intelligent learning, as shown in Figure 1.

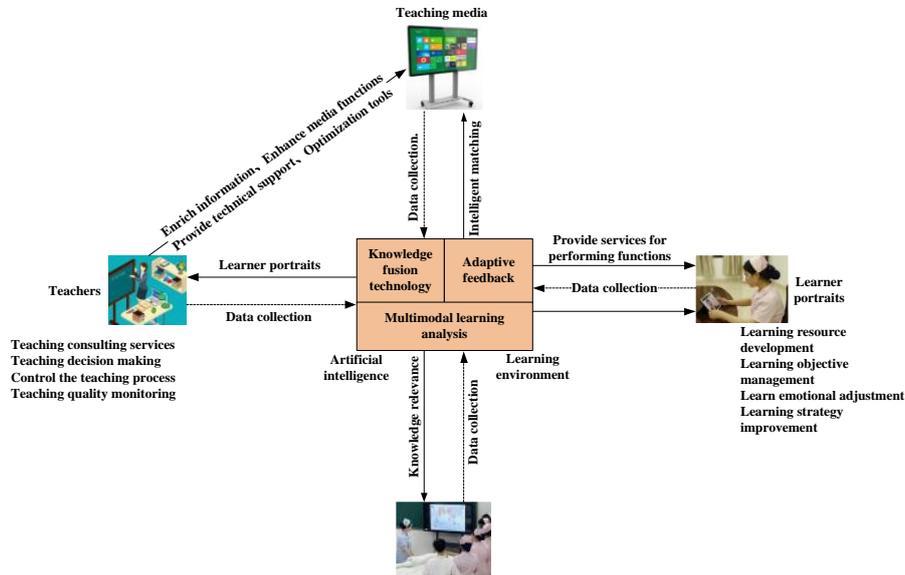


Fig. 1. Concept of UDL-based online-offline dual-teaching model

According to the implementation layer of online-offline dual-teaching UDL system, it can be divided from low to high into: the basic value orientation of "respect differences and realize individualized development", the core value orientation of "strengthen collaboration and establish a human-machine symbiosis", and the target value orientation of "reconstruct literacy and cultivate expert learners", as shown in Figure 2. Considering the basic value orientation of UDL involved many times, this paper is focused on the core value orientation, target value orientation. At the core value orientation level, despite a learning ecology pursued by multiple learning concepts in the artificial intelligence era, human-computer collaborative learning emphasizes "human-computer knowledge acquisition", which requires UDL to develop to "human-computer knowledge creation" pursued by human-computer symbiosis. Compared with the former, human-computer symbiosis, as a more advanced human-computer learning form, can facilitate "psychological" learner-agent compatibility, promote the mutual transformation of tacit knowledge, and achieve the collaborative creation of knowledge. At the target value orientation level, in the artificial intelligence environment, not limited to satisfying individual learning needs, UDL should set the goal of cultivating expert learners. Expert learners refer to those with specific expertise and outstanding performance in the learning field. Figure 3 shows the practical scenario of UDL-based online-offline dual-teaching model in the course.

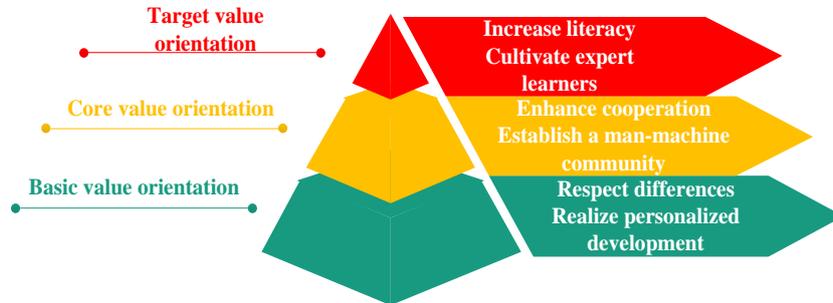


Fig. 2. UDL-based online-offline dual-teaching model construction system



Fig. 3. Practice scenario of UDL-based online-offline dual-teaching model

3.2 The teaching evaluation of intuitionistic fuzzy comprehensive evaluation method in virtual surgical nursing curriculum

Intuitionistic fuzzy expands traditional fuzzy theory. Because information of membership, non-membership and hesitation are taken into account in intuitionistic fuzzy sets simultaneously, it is more practical and flexible in handling ambiguity and uncertainty than traditional fuzzy sets. Comprehensive evaluation of multiple attributes is an application of intuitionistic fuzzy. Delphi method, also known as expert consultation method, is widely used in traditional fuzzy comprehensive evaluation for the determination of membership. However, in intuitionistic fuzzy, it is not suitable to be directly used because it needs to take into account information of membership, non-membership and hesitation. By improving the method of expert scoring, this paper proposes that the intuitionistic fuzziness exists in the index of the evaluated object, so as to generate the intuitionistic fuzzy number needed in the intuitionistic fuzzy comprehensive evaluation.

Definition 1 Suppose X is a non-empty set, then the following

$$F = \{(x, \mu_F(x)) | x \in X\} \tag{1}$$

Is the fuzzy set, where, μ_F is the membership function of the fuzzy set F: $X \rightarrow [0,1]$, $\mu_F(x)$ is the membership degree of the element X in x belonging to F, and the value of the unit interval $\mu_F(x)$ is $[0, 1]$.

Definition 2 Suppose x is a non-empty set, then the following

$$A = \{ \langle x, \mu_A(x), \nu_A(x) \rangle | x \in X \} \tag{2}$$

Is an intuitionistic fuzzy set, where, $\mu_A(x)$ and $\nu_A(x)$ are the membership and non-membership degrees of the element X in x belonging to A, namely,

$$\mu_A(x): X \rightarrow [0,1], x \in X \rightarrow \mu_A(x) \in [0,1] \tag{3}$$

$$\nu_A(x): X \rightarrow [0,1], x \in X \rightarrow \nu_A(x) \in [0,1] \tag{4}$$

It meets the condition

$$0 \leq \mu_A(x) + \nu_A(x) \leq 1, x \in X \tag{5}$$

In addition

$$\pi_A(x) = 1 - \mu_A(x) - \nu_A(x), x \in X \tag{6}$$

Indicates the hesitation or uncertainty of the element X in x belonging to A.

Definition 3 $\alpha = (\mu_\alpha, \nu_\alpha)$ is an intuitionistic fuzzy, where,

$$\mu_\alpha \in [0,1], \nu_\alpha \in [0,1], \mu_\alpha + \nu_\alpha \leq 1 \tag{7}$$

Let θ be the set of all intuitionistic fuzzy numbers, obviously, $\alpha^+ = (0,1)$ is the largest intuitionistic fuzzy number and $\alpha^- = (0,1)$ is the smallest intuitionistic fuzzy number.

In order to evaluate the intuitionistic fuzzy numbers and compare the value of two intuitionistic fuzzy numbers, define the score function and exact function of the intuitionistic fuzzy number $\alpha = (\mu_\alpha, \nu_\alpha)$ as $s(\alpha)$ and $h(\alpha)$, respectively.

$$s(\alpha) = \mu_\alpha - \nu_\alpha \tag{8}$$

$$h(\alpha) = \mu_\alpha + \nu_\alpha \tag{9}$$

$s(\alpha)$ is the score value of α , $s(\alpha) \in [-1,1]$. $h(\alpha)$ is the accuracy of α , the larger the value $h(\alpha)$, the higher the accuracy of the intuitionistic fuzzy number α . And there exists a relationship:

$$\pi_\alpha + h(\alpha) = 1 \tag{10}$$

Definition 4 Let $\alpha_1 = (\mu_{\alpha_1}, \nu_{\alpha_1})$ and $\alpha_2 = (\mu_{\alpha_2}, \nu_{\alpha_2})$ be the intuitionistic fuzzy numbers, $s(\alpha_1) = \mu_{\alpha_1} - \nu_{\alpha_1}$ and $s(\alpha_2) = \mu_{\alpha_2} - \nu_{\alpha_2}$ are the score value of α_1 and α_2 respectively, $h(\alpha_1) = \mu_{\alpha_1} + \nu_{\alpha_1}$ and $h(\alpha_2) = \mu_{\alpha_2} + \nu_{\alpha_2}$ are the accuracy of α_1 and α_2 respectively, then

If $s(\alpha_1) < s(\alpha_2)$, then α_1 is less than α_2 , denoted as $\alpha_1 < \alpha_2$;

If $s(\alpha_1) = s(\alpha_2)$, then

If $h(\alpha_1) = h(\alpha_2)$, then α_1 equals to α_2 , that is, $\mu_{\alpha_1} = \mu_{\alpha_2}$ and $\nu_{\alpha_1} = \nu_{\alpha_2}$, denoted as $\alpha_1 = \alpha_2$;

If $h(\alpha_1) < h(\alpha_2)$, then α_1 is less than α_2 , denoted as $\alpha_1 < \alpha_2$;

If $h(\alpha_1) > h(\alpha_2)$, then α_1 is larger than α_2 , denoted as $\alpha_1 > \alpha_2$.

Therefore, the comparison principle of the intuitionistic fuzzy number is: the higher the score value, the greater the intuitionistic fuzzy number; if the score value is equal, the higher the accuracy, the greater the intuitionistic fuzzy number.

Definition 5 Let $\alpha_j = (\mu_{\alpha_j}, \nu_{\alpha_j}) (j = 1, 2, \dots, n)$ be a set of intuitionistic fuzzy numbers, and IFWA: $\theta^n \rightarrow \theta$, if

$$IFWA_{\omega}(\alpha_1, \alpha_2, \dots, \alpha_n) = \omega_1 \alpha_1 \oplus \omega_2 \alpha_2 \oplus \dots \oplus \omega_n \alpha_n = \left(1 - \prod_{j=1}^n (1 - \mu_{\alpha_j})^{\omega_j}, \prod_{j=1}^n \nu_{\alpha_j}^{\omega_j} \right)$$

, Then IFWA is called the intuitionistic fuzzy weighted average operator, where, $\omega = (\omega_1, \omega_2, \dots, \omega_n)^T$ is the weight vector of $\alpha_j (j = 1, 2, \dots, n)$,

$$\omega_j \in [0, 1] (j = 1, 2, \dots, n), \sum_{j=1}^n \omega_j = 1.$$

It is necessary to pay attention to the following points when applying online-offline dual-teaching model usability evaluation system for surgical nursing course.

1. Focus on teacher-student two-way evaluation: teaching activities are bidirectional. The evaluation index system of online-offline dual-teaching model not only evaluates students' learning quality, but also evaluates teachers' online teaching ability. Therefore, teachers and students should be included as subject of evaluation. It is worth noting that the dimension of "supporting the development of learning skills" in the evaluation system is focused on assessing students' ability to use case library network teaching resources for self-directed learning, communication, teamwork, information utilization, critical thinking, and clinical decision-making. Therefore, students' individual self-evaluation is adopted, and teachers do not participate in peer assessment.
2. Comprehensive and multiple evaluation: during the evaluation of online teaching quality, it is necessary to combine the objective data of the platform (such as platform task completion rate, student personal learning growth curve, role advance-

ment, etc.) with other subjective and objective teaching evaluation indexes (such as final exam results, teacher evaluation, etc.), conduct comprehensive and multiple evaluations to reflect students' actual learning effects.

- Promote teaching by evaluation and continuously improve teaching quality: the results of platform usability evaluation should be used to further guide online teaching resource construction, teaching activity design and teaching content selection, to promote the sustainable development of online teaching, as shown in Table 1.

Table 1. Evaluation index system of online-offline dual-teaching model of surgical nursing

Index	Importance evaluation ($\bar{x} \pm s$)	Variable coefficient	Combination weight
I Platform availability	4.85±0.37	0.08	0.342
I -1 learnability	4.80±0.41	0.09	0.076
I -2 usability	4.80±0.41	0.09	0.074
I -3 memorability	4.25±0.91	0.21	0.063
I -4 fault tolerance	4.35±0.67	0.15	0.067
I -5 Subjective pleasure	4.10±0.79	0.19	0.063
II Teaching effectiveness	5.00	0	0.350
II -1 Support the organization of teaching and learning	4.80±0.52	0.11	0.116
II -2 Support the teaching and learning process	4.90±0.45	0.09	0.120
II -3 Support the development of learning skills	4.75±0.44	0.09	0.114
III Additional effectiveness	4.45±0.83	0.19	0.308

3.3 The application of dual-teaching model in virtual teaching of surgical nursing

As shown in Figure 4, the scenario-based learning activity design is aimed to realize the curriculum goals. Planning and designing learning activity types, activity methods, activity results, and evaluation of activity results will help clarify the path of scenario-based learning in surgical nursing. The scenario-based learning in surgical nursing is prominently characterized by learner-centered activity design, which manifests the design essence of multi-scenario and individualized learning. The design of activity types and methods need to satisfy the needs of surgical nursing students' learning needs anytime, anywhere of different motivations, including the content they want to learn. The design of methods and strategies should satisfy learners' need of learning contents of different levels and requirements by different learning approaches and methods, so as to adapt to different learning rhythms of learners. The design of learning scenarios should meet the needs of learners to choose different locations, times, and types of techniques for multi-scenario learning of surgical care. The design of support services for learning activities should follow the three key steps of scenario-based calculation of data, understanding of user scenario requirements, and matching and pushing of scenario requirements content, thereby providing accurate scenar-

io-based services. After discussing the essentials of the design of virtual-real integrated scenario-based surgical nursing teaching, it is necessary to think about the design of learning activities supported by virtual-real scenarios, clarify the essential connotation and constituent elements of learning activities, analyse and sort out the types and sequence structure of activities, propose a virtual-real integrated scenario-based learning activity design framework according to activity theory.

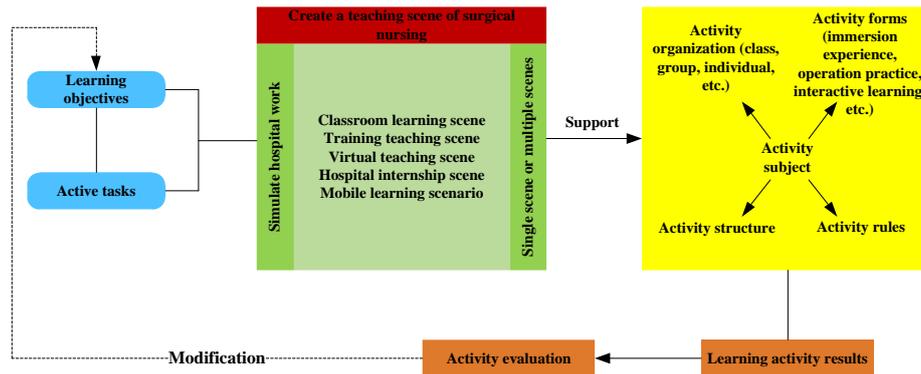


Fig. 4. The framework design of virtual-real integrated scenario-based learning activities in surgical nursing teaching

4 Teaching example and effect

4.1 Teaching example

As shown in Figure 5, there are three types of courses for dual-teaching, namely, summary and promotion curriculum, parallel curriculum, and heuristic curriculum. The summary promotion curriculum is aimed at helping students conduct systematic review and enhance their comprehensive level and competence. Parallel curriculum refers to the teaching content parallel and connected with the usual courses. Heuristic curriculum similar to expert lectures for students can help give full play to famous teachers' advantages, aiming to inspire students' learning ideas, expand and extend teaching content in the classroom. In this study, an online-offline dual-teaching model is constructed for teachers and students, which involves pre-class stage, in-class stage, and after-class stage according to the teaching process.

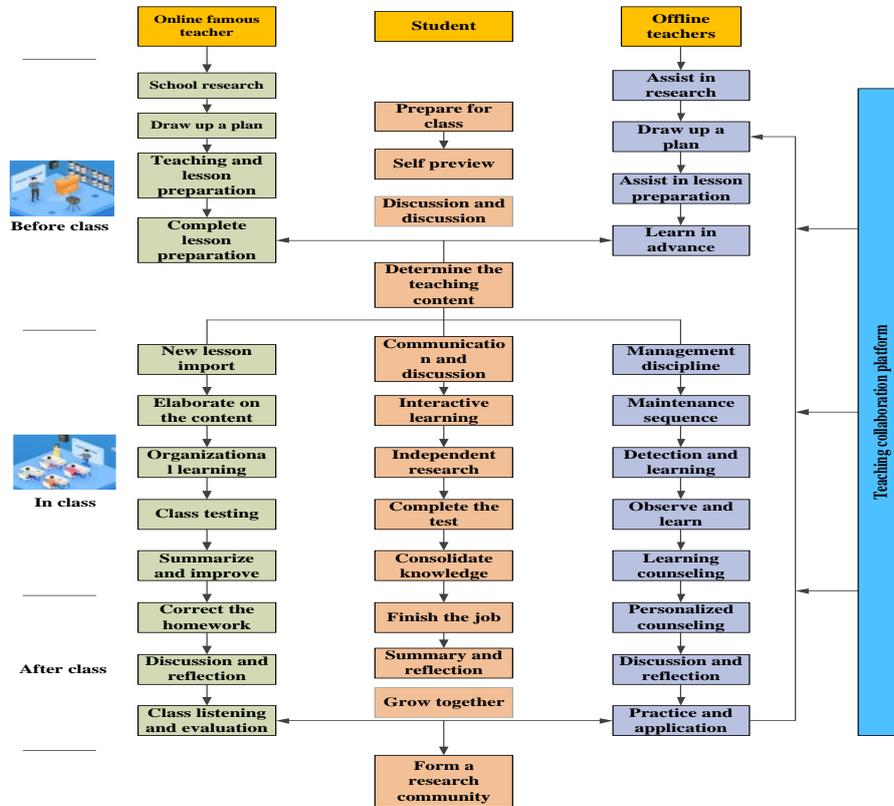


Fig. 5. Online-offline dual-teaching model construction diagram

At the stage of pre-class preparation, online famous teachers firstly need to conduct school investigation to know basic school information and students' learning situation. Offline teachers know better about learning situation than online teachers. Therefore, offline teachers need to complete their primary task of helping online famous teachers quickly know the learning situation. Then, according to the field research, online and offline teachers coordinate to prepare lessons, discuss and determine the teaching goals, select teaching resources, arrange teaching methods. Then, online famous teachers initially complete the teaching design. By virtue of file transfer function of teaching collaboration platform, online teachers send their teaching plans to offline teachers, and offline teachers need to study in advance to prepare for class. For students, their pre-class learning tasks include autonomous preview of knowledge points in advance and preparation for class.

As shown in Figure 6 below: at the stage of class live teaching, online teachers are mainly engaged in teaching activities through live broadcast, such as introducing new lessons, stimulating learning interest, explaining knowledge points, organizing student learning, and taking quizzes on the teaching collaboration platform, tracking students' learning situation, checking and finding leaks. Offline teachers serve as famous teach-

ers' assistants, mainly responsible for assisting online famous teacher in classroom discipline management and classroom order maintenance. In the meantime, offline teachers can track students' learning condition during the live broadcast and they are much closer to students spatially than online famous teachers. Therefore, it is also vital to supervise students' learning situation in the classroom and answer questions timely. In addition, offline teachers can also learn and improve themselves when assisting online teachers in carrying out teaching activities. Observation and learning are also an important part of offline teachers' work. For students, their primary learning tasks in the class include communication and discussion, interactive learning, internalization of knowledge, and completion of tests.



Fig. 6. Demonstration link in class live teaching

At the stage of after-class feedback for discussion and reflection, online teachers are mainly responsible for correcting homework, summarizing the common and individual problems in the homework, and assessing students' learning. In the meantime, they discuss and reflect on the problems in this teaching activity with offline teachers, and formulate teaching plan for the second online teaching activity based on the feedback and reflection results. In addition, when offline teachers carry out normal teaching activities, online famous teachers need to listen to and evaluate lessons to help them improve teaching ability. The primary task of offline teachers after class is to provide individualized assistance for students and assist students in making up for knowledge gaps. Through online famous teachers' observation, they can explore and practice, thus changing teaching methods and strategies. For students, the primary learning tasks after class include completing homework, self-summary and reflection, etc.

4.2 Teaching effect

In this study, a total of 85 nursing students of grade 2019 in a university were selected for practice of surgical nursing course. They were divided into a control group and an experimental group by random grouping method. 44 students from class 1 in the experimental group received the teaching method of this study; 41 students from class 2 in the control group received traditional teaching method. There was no significant

difference in the results of students in the two groups before the experiment, and they were comparable.

Comparison of exam results between students in the two groups (see Table 2). It can be seen from Table 2 that the usual grade, final grade and total points of students in the experimental group are higher than those of the control group, and the difference was statistically significant ($P < 0.05$).

Table 2. Comparison of exam results between students in the experimental group and control group (Scores)

Group	Usual scores	Final scores	Total scores
Experimental group (n=44)	26.1±4.8 [#]	63.2±3.9 [#]	89.3±8.7 [#]
Control group (n=41)	22.4±3.1 [#]	58.6±2.2 [#]	81.0±5.3 [#]

Note: Compared with the control group, [#] $P < 0.05$.

Comparison of learning enthusiasm between students in the two groups (see Table 3). In view of the times of asking questions, the times of discussion and statements, the time of consulting data, and the time of self-learning, students in the experimental group have stronger learning enthusiasm than those in the control group, and the difference was statistically significant ($P < 0.05$).

Table 3. Comparison of learning enthusiasm between students in the experimental group and the control group ($\bar{x} \pm s$)

Group	Asking questions (Times/class hour)	Discussion (Times/class hour)	Self-learning time (h/d)
Experimental group	13.7±4.9	14.9±5.1	1.4±0.4
Control group	7.1±2.6	7.8±3.2	0.6±0.3

Note: Compared with the control group, [#] $P < 0.05$.

As shown in the results of this study, the dual-teaching model can significantly improve examination results, fully mobilize students' enthusiasm for learning, and increase the frequency of students' asking questions, discussing, speaking and consulting data. Students' autonomic learning ability, personal development ability, communication skills, mastery of nursing knowledge, problem analysing and solving capabilities have been significantly improved compared to traditional multimedia teaching method. Thanks to the distance education in the double-teaching process, there is no need to worry about the lack of knowledge when applying this teaching method. If students find any inadequate mastery of a certain knowledge point during learning, as long as they choose the previous recording and broadcasting course, this problem can be effectively solved. Therefore, students will learn more conveniently and strengthen their enthusiasm for learning accordingly. In addition, by means of QR codes, online-offline teaching platforms, paper textbooks, online textbook electronic resources and online teaching platforms can be organically connected, effectively making up for the blank content in paper textbooks. Teachers can update online electronic resources any time and expand teaching content effectively, thus making up for insufficient time in classroom teaching, helping some students to review and study in their spare time,

and improving their academic record. This teaching model is available to vividly display the steps of nursing operation. With the advantages of abundant video resource and great convenience, the environment of surgical nursing teaching can be greatly improved and a learning environment improves for fast dissemination of information can be created based on rich network resources. As a result, it strengthens interaction between teachers and students, further enhances students' enthusiasm and initiative in learning.

5 Conclusions

With the rapid development of Internet technology, people's lives cannot be separated with Internet. Online teaching has been extensively applied in college course teaching. In view of the disadvantages of traditional teaching model of surgical nursing curriculum in colleges and universities to the long-term development of teaching, an online-offline dual-teaching model is proposed in this study, which has good teaching effects, deserves promotion and reference. The specific conclusions are as follows:

A new dual-teaching model is proposed in this study based on online-offline education technology, which is centered on the common growth of teachers and students by a variety of teaching methods such as dual teacher mutual cooperation and collaboration, aiming at developing students' practical ability. From the perspective of teachers and students, this model can significantly enhance the teaching effect of surgical nursing.

By reasonably applying the effective blended teaching based on virtual technology, teachers can dynamically control students' learning condition and manage online-offline classrooms, thereby optimizing curriculum management, strengthening teacher-student interaction, and enhancing students' curriculum participation.

In intuitionistic fuzzy comprehensive evaluation of different operators, it is an essential solution step to generate a set of intuitionistic fuzzy numbers. The application of examples in this study shows that by applying Delphi method in reclassification of reviews, it is feasible to generate intuitionistic fuzzy number sets, and it is also an objective and scientific evaluation approach for this teaching model.

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