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The Application of Formative Evaluation to Online Teaching of "Doctor-Patient Communication Skills"

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Abstract. Purpose: to investigate the application of formative evaluation to online teaching of "Doctor-Patient Communication Skills". Methods: taking three classes of students majored in Medical Imaging Technology (entered our college in the year 2018) as the research objects, who are divided into the experimental group and control group. The experimental group focuses on the teaching method of online formulative evaluation, while the control group centers on face-to-face classroom teaching. Contrastive analysis is conducted on the online learning of experimental group, including online independent learning, online interaction, module completion, chapter test, and final exam results. Then, the final scores of students in each group are compared. Through questionnaires in each class, students' assessment about formative evaluation of online teaching and classroom teaching is compared. Results: by contrasting the satisfaction of teaching methods and the satisfaction of self-evaluation, the experimental group is better than contrast group ($P<0.05$); by contrasting theoretical score, the experimental group is higher than the contrast group ($P<0.05$); the teaching ability of members in experimental group is better than that of contrast group ($P<0.05$); the CTDI-CV score of students in experimental group is obviously higher than that of the contrast group ($P<0.05$). Conclusion: Formed in the doctor-patient communication skills online teaching evaluation scheme applied value, students can very clearly know oneself in the course of the study situation, timely reflection, find out the deficiencies, lessons learned, at the same time making efforts in the direction of the next stage and target, at the same time, teachers can grasp the characteristics of formative assessment, according to the result of formative assessment, Grasp the analysis and improvement of students' learning process in teaching practice and help formulate more effective teaching methods. It can improve students' final score and teaching satisfaction.

Keywords. Formative evaluation, doctor-patient communication skills, online teaching, application value

1. Introduction

This paper combines formative evaluation with the online teaching of Doctor-patient Communication Skills to study the application and effect of formative evaluation in the online teaching of doctor-patient Communication Skills in the teaching process. In the whole teaching process to form a system of dynamic evaluation system, continuous use,

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six minutes, phase contrast experiment method, using SPSS23.00 statistical analysis software, through the application of formative assessment to find enhance the teaching effect in the doctor-patient communication skills to learn online strategy, provide the basis for the teacher clear understanding of students learning process in time, Alleviate teachers' "teaching anxiety" and students' "learning panic" in online teaching. The teaching method of the course is optimized, the teaching effect is improved, and the students' communication skills and comprehensive quality are improved.

The formative evaluation method is to master students' learning situation at real time by tracking students' daily performance. Taking this as the referential basis, it will actively consummate the teaching mode and safeguard the efficiency of high-quality teaching [1]. Based on online learning platforms, formative evaluation is applied to the teaching of "Doctor-Patient Communication Skills". Through observing students, raising questions, observing their performance, their learning attitude, participation degree, homework acceptance, periodical mastery degree, skills training, and chapter test, monitoring and evaluating students' knowledge, skills, as well as the formation and improvement of their learning attitude, and feeding back the information to teachers and students in time, teaching methods will be adjusted in time. Meanwhile, the feasibility and existing problems of applying formative evaluation to the online teaching of "Doctor-Patient Communication Skills" will be studied, to find out strategies and methods of improving the teaching effect of this course by applying formative evaluation [2].

2. Materials and Methods

2.1 General Materials

Two classes of 2018 medical imaging technology major in our hospital were studied, including 124 students from Class 1 and 90 students from Class 2, totaling 214 students. 62 students from class 1 and 45 students from Class 2 were randomly selected. to from the experimental group, while the remaining students form the contrast group, with 107 members in each group. There are 50 male students and 57 female students in the contrast group (n=107), with the age threshold of 20-24 years old and the average age of (22.29±1.41) years old. There are 60 male students and 47 female students in the experimental group (n=107), with the age threshold of 19-24 years old and the average of (22.33±1.65) years old. After the contrast, the result shows that there is no significant difference ($P>0.05$) among all the materials of all the students, so it is comparable.

2.2 Research Methods

All the 214 students are ensured to complete 24 class hours of online teaching activity of "Doctor-Patient Communication Skills", with unified teaching materials. Meanwhile, both groups are ensured to keep the same teaching schedule, and this teaching task is completed by the teachers in the same teaching and research section.

2.2.1 Regular teaching methods are conducted on the students of the contrast group.

Designated teachers are required to vividly display the teaching contents to students through multi-media devices. After finishing the course, paper test for students would

be performed without looking through any reference. Then, the test scores would be collected, to evaluate the effectiveness of teachers' teaching.

2.2.2 Based on the teaching methods of the contrast group, formative evaluation is performed on the students of the experimental group: including:

① to master the previously learned knowledge of students through presentation before class; ② to observe students' classroom performance, and make detailed records in their performance handbook; ③ to regularly conduct periodical tests on students, and set corresponding test questions with purpose; ④ to ask students to complete the questionnaire of self-evaluation, to summarize self-performance. Select computer network terminal or mobile APP of an online learning platform, and establish course resources. Then, students would enter the course learning through scanning QR code, and set different learning modules at different stages of course learning in line with the requirements of formative evaluation, including preview before class, course content, rushing to answer, discussion about knowledge, knowledge expansion, after-class test, after-class assignment, chapter test, and examination. For each stage, each chapter or module, students' learning situation and effects will be collected and analyzed before the next period of class, including the student number of finishing the tasks, positivity of rushing to answers, the number of taking part in free discussion, completion of after-class assignment, after-class test results, chapter test results, and exam results. Meanwhile, the data will be collected in time, and periodical analytical data of students' learning situation will be fed back to other teachers and students themselves before the next period of class, so that it is convenient for teachers to improve their teaching, and helps students to correct their learning methods and attitude. At the same time, students' feedback to teachers will be received, to realize two-way feedback system.

The above steps can be represented in Figure 1.

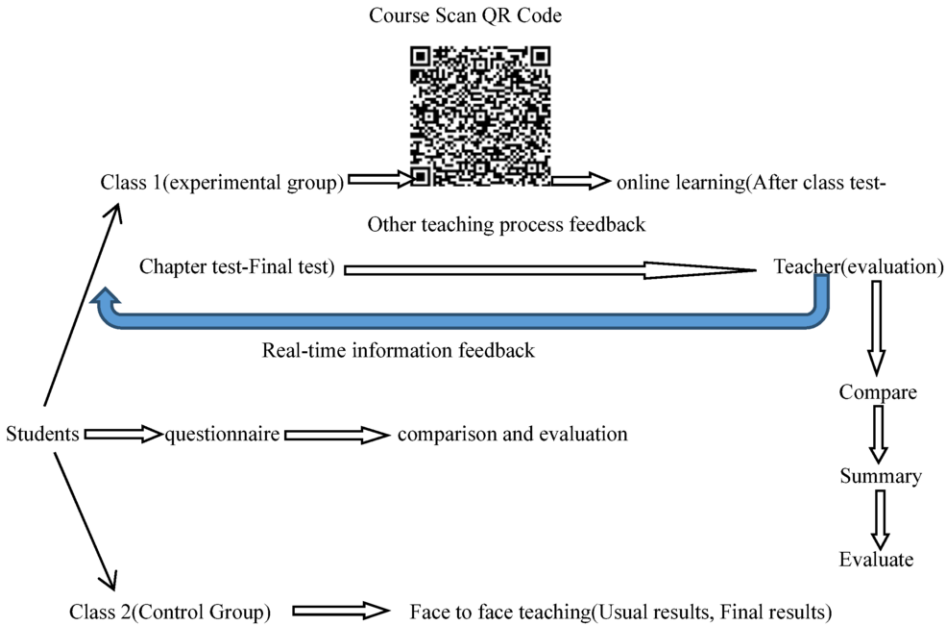

Fig 1. Research method flow architecture diagram

2.3 Evaluation Contents and Methods

2.3.1 Analyze the online learning situation of the experimental group, including: online independent learning, online interaction, module completion, chapter test, and final exam result.

2.3.2 Compare the total score of final exams for students in both groups.

2.3.3 Through class questionnaire investigation, students' evaluation on online formative evaluation teaching and face-to-face teaching is compared.

2.3.4 Through all kinds of evaluation mechanisms for teachers' teaching ability, the evaluation on enhancing the teaching ability of teachers in both groups is compared.

2.4 Statistics Analysis

The experimental data is recorded in Excel 2021 form, and the statistical analysis software is SPSS23.00. Enumeration data is treated with X^2 test; while measurement data is treated with t test. Taking<0.05 as the judgment basis, the statistics in the group is analyzed.

3. Results

3.1 Comparison of Satisfaction about Both Groups

After systematic learning, the satisfaction level to teaching methods of students in the experimental group is obviously better than that of the contrast group, so it features outstanding statistical significance($P<0.05$), which is shown in Table 1. The passing rate of theoretical knowledge for students in the experimental group is 100.00%, while there are 5 students in the contrast group with their scores lower than 60, so the passing rate of theoretical knowledge is 86.36%. The difference of these two sets of data is of statistical significance($P<0.05$).

Table 1 Analyze and Compare the Satisfaction of Students in Both Groups

Groups	Casenumber	Teaching method			Self-evaluation		
		Satisfied	Good	okay	satisfied	good	okay
The experimental group	107	80 (74.77)	27 (25.23)	0 (0.0)	90 (84.11)	17 (15.89)	0 (0.0)
The contrast group	107	70 (65.42)	30 (28.03)	7 (6.55)	75 (70.09)	27 (25.23)	5 (4.68)
t-value	-	-	-	7.236	-	-	5.119
P-value	-	-	-	0.007	-	-	0.023

3.2 Comparison of Theoretical Results of Both Groups

After comparing theoretical results, the result of experimental group is higher than that of the contrast group ($P<0.05$), which is shown in Table 2.

Table 2 Comparison of Theoretical Results of Both Groups [n（$\bar{x}\pm s$）]

Group/item	n	Theoretical results
Experimental group	107	80.89±6.40
Contrast group	107	75.89±7.90
t	-	5.0870
P	-	0.0000

3.3 Measurement Results of CTDI-CV Scale for Students in Both Groups (see Table 3)

The index scores of basic quality, content skills, teaching method, teaching attitude, and teaching ability of members in the research group are all higher than those of referential group, P＜0.05, which is shown in Table 3.

Table 3 The Total CTDI-CV Score of Students of Both Groups and the Score of Different Dimensions [n（$\bar{x}\pm s$）]

Item	**Contrast group (n=107)**	**Experimental group (n=107)**	***P-value***	***t-value***
Seek truth	27.15±5.78	28.13±6.52	0.05	0.3854
Open mind	30.42±8.03	37.50±6.47	<0.05	0.0000
Analytical ability	28.30±6.50	37.43±7.49	<0.05	0.0000
Systematical ability	30.21±6.20	30.07±6.52	0.05	0.9043
Self-confidence	24.15±4.29	37.30±5.37	<0.05	0.0000
Desire for knowledge	24.45±5.08	29.42±5.25	<0.05	0.0000
Cognitive maturity	28.15±8.04	35.50±7.03	<0.05	0.0000
Total score	192.26±38.11	235.30±40.07	<0.05	0.0000

3.4 Evaluation on Enhancing Teaching Ability of Personnel in Both Groups

The CTDI-CV score of the students in the research group is significantly higher than that of the referential group. And the scores for indicators, like seeking truth, opening mind, analyzing ability, systematical ability, confidence and desire for knowledge, and recognition maturity, for the members in the research group are all higher than those of the referential group, with P＜0.05, seen in Table 4.

Table 4 Comparison for the Improvement of Teachers' Teaching Ability in Both Groups [n（$\bar{x}\pm s$）]

group/item	**The experimental group(n=107)**	**The contrast group(n=107)**	**t**	**P**
Basic quality	27.12±5.80	22.22±4.21	7.072	0.0000
Content skills	43.69±8.30	32.80±6.20	8.152	0.000
Teaching methods	15.01±1.79	13.18±2.80	4.4395	0.0000
Teaching attitude	17.40±3.30	15.62±2.30	3.5677	0.0005
Teaching ability	103.22±17.20	97.60±12.50	2.1309	0.0350

4. Analysis and Discussion

In traditional educational methods, due to the influence of exam-oriented education, students only pay attention to final exam results. And when evaluating the teaching quality, students' examination scores are regarded as the only evaluation standard [3]. However, the formative evaluation focuses on students' performance in their learning process, which can actively lead teachers to effectively adjust their teaching methods through students' actual learning. Therefore, a good atmosphere of "benefiting teachers and students as a whole" would be created for students [4]. This evaluation method can not only improve some weaknesses in teaching, but also inspire students' positivity of learning. When teaching "Doctor-Patient Communication Skills", the educational function of formative evaluation should be given full play to, to break through the single assessment model, thus leading students to feel the enjoyment of learning to the full. This method can help students conduct active and in-depth research about the ever-changing "Doctor-Patient Communication Skills", and help them solve some real problems during the process of learning "Doctor-Patient Communication Skills" with other students, to avoid students being over-stressed for attaching too much attention to the test scores and inhibiting their learning effects [5]. Formative evaluation was first put forward by Professor Scriven, an educational expert of Harvard University, in his works of "Teaching Education" in 1967, which was then introduced to the teaching area by B. S. Bloom from Chicago University. With continuous perfection, the teaching strategies for mastering learning was put forward [6]. Its purpose is to promote students' development, to evaluate students' feelings, attitudes, ability, and strategy performed in the process of learning, and to feed back the results to teachers and students in time. In this way, it will promote the adjustment and improvement of both parties of teaching, and help form a more effective teaching process [7]. The research dissertations about formative evaluation in medical education first appeared on journals in 1994. With constant development of formative evaluation, its application in medical education has been greatly increased. Since 2014, the number of published dissertations has been increased sharply, arousing the concern of more and more researchers, but with uneven progress [8]. Doctor-patient communication is one of the compulsory subjects of humanistic quality education of medical students, and good communication skill is a key method to reduce the rate of doctor-patient disputes. However, colleges and universities in China now have not attached great importance to the humanistic quality education of medical students, so there are few projects for medical colleges to effectively apply formative evaluation to the humanistic quality education [9]. According to the "Opinions on strengthening the application and management of online open course construction in colleges and universities" published by The Ministry of Education in 2015 and the "Instruction on organizing and managing online teaching in regular institutions of higher education during the COVID-19 period from the office of COVID-19 working group" from the higher education office [2020] No. 2 document, "the internet +" education has become a significant method for the medical education in the new era[10]. Online teaching has become a mainstream teaching style now. At present, "Doctor-Patient Communication Skills" mainly combines traditional teaching method and online teaching method, so how to improve the quality of this course's online teaching quality has become a focus of all the teachers. Meanwhile, there are few research about the online teaching methods of this course both at home and abroad, and there are fewer researches of combining how to

make "the internet +" online teaching platform more intelligent, flexible, and real-time, with the systematic, process, and periodical test of formative evaluation.

The concept of formative evaluation was first put forward by G. F. Scriven in the course improvement in 1967, which was relative to summative evaluation, to make educators examine the science and rationality of the evaluation system. It transfers the evaluation system to teaching process, requiring teachers to evaluate their students at any time when performing teaching activities. Meanwhile, teachers are required to understand students' mastery of knowledge when performing the evaluation results, so as to give further play to students' learning ability and help them take a correct attitude. Formative evaluation is process evaluation in nature, which values students' mastery of course knowledge and skills during the teaching process, and concerns about students' long-term and overall development. Compared with summative evaluation, it features the following merits: first, it realizes comprehensiveness viewing from the evaluation process. Formative evaluation goes through the whole learning process of students. During students' learning process, students' psychological status and learning status can be understood through observation and communication, which can be regarded as the evaluation basis. In this way, students' learning can be mastered in an all-around way. Therefore, when carrying out teaching activities, it will be more targeted and directive, to arouse students' interest in English learning, and to avoid the asymmetric information about the teaching concept between teachers and students. Second, it realizes complete coverage of evaluation subjects. Formative evaluation includes students' self-evaluation, peer evaluation, teachers' evaluation, parents' evaluation, and contract evaluation. This new evaluation method does not take achievements as the evaluation standard and basis any more, but pays more attention to students' comprehensive ability, to dig out students' potential and fully carry out the "student-oriented" concept. Therefore, students will become "masters of evaluation" from "evaluated persons". Third, it realizes scientific viewing from the evaluation results. Formative evaluation can be applied to the whole stage of teaching activities, which can provide reliable teaching information to students and teachers, understand students' real situation, lead students to take an active part in teaching activities, promote students to establish their learning confidence, and radically change students' passive situation in learning. In other words, the evaluation results would be scientific and reasonable, and can be fed back to teaching activities as effective information in time.

With continuous innovation of teaching methods, the weaknesses of summative evaluation have been gradually presented out. However, in practice application, formative evaluation mainly centers on cultivating students, and the teaching focus is not limited on the scores of students, but the attitude and improvement of students in learning process. Meanwhile, formative evaluation attaches extremely importance to students' emotions, attitudes, and values. Through different perspectives and different dimensions, it would make comprehensive evaluation on students, to stand out the principal status of students. Meanwhile, in formative evaluation process, it would form a harmonious student-teacher relationship, to help teachers further find out students' learning requirements, and to carry out their teaching with more accurate targets. Through the analysis and research, we can see that when comparing students' satisfaction about teaching methods and self-evaluation, the satisfaction level of experimental group is higher than that of the contrast group, $P<0.05$; when comparing the theoretical results, the result of experimental group is higher than that of the contrast group ($P<0.05$); the teaching ability of members in experimental group is

better than that of the contrast group, P<0.05; and the CTDI-CV score of students in experimental group is obviously better than that of the contrast group, P<0.05. The reasons are as follows: through the application of formative evaluation, the strategies of improving online teaching effects of "Doctor-Patient Communication Skills" can be found out, to provide basis for teachers to make clear of students' learning process, and to relieve teachers' "teaching anxiety" and students' "fear of learning" in online teaching. Therefore, the teaching methods of this course will be optimized, the teaching effects will be enhanced, and students' communication skills and comprehensive quality will be improved. Meanwhile, formative evaluation attaches great importance to students' emotional attitude and values, which can carry out comprehensive evaluation on students from various perspectives and various dimensions. As a result, students' principal status will be explicit. Meanwhile, in formative evaluation process, it would form a harmonious student-teacher relationship, to help teachers further find out students' learning requirements, and to carry out their teaching with more accurate targets.

5. Conclusions and Reflection

5.1 Conclusions

When making use of formative evaluation in the process of teaching "Doctor-Patient Communication Skills", students can directly feedback their learning effects, and teachers can master students' learning during each stage at the first time, to give targeted after-class tutoring. Students can summarize their mastery of the course knowledge through formative evaluation, and directly feedback their problems of "not knowing how to learn or not comprehending the course" to teachers. At last, the total score of the final exam will be enhanced, students' learning independence will be improved, and teachers' teaching ability will be improved. The performance of formative evaluation can not only help students master the learning of "Doctor-Patient Communication Skills", but also consolidate students' professional skills, to achieve favorable teaching effect. Therefore, "Doctor-Patient Communication Skills" has favorable promotion value in clinical teaching. On the other hand, teachers can continuously optimize their teaching, lead students to carry out online independent learning, enhance their online teaching quality, improve their information teaching ability, and to achieve complementary growth between teachers and students. Meanwhile, this will offer references to online formative evaluation of this course and medical humanities education.

5.2 Reflection

In the application of clinical teaching, it is found out that the application of formative evaluation in online teaching requires favorable learning initiatives of students, so that they can feedback their learning to teachers in time. Meanwhile, teachers should possess high information teaching ability and the ability to analyze and deal with the materials. It also has high standards for the teaching facilities, requiring the regular operation of network teaching platforms, rich teaching resources, as well as fast network operating speed of the teaching devices.

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