

Teaching Design and Application of “Medical Physics” Course Based on Rain Classroom

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Abstract: Under the premise of the hardware support of Rain Classroom, teaching in colleges and universities should also pay attention to the exploration of teaching design, curriculum ideology and politics. Based on the analysis on its supporting theory and core teaching concepts, this article proposed to use SPOC and Rain Classroom as the smart teaching platform to design the course content of “Medical Physics” in medical colleges and universities, and achieve the ideal teaching effect through teaching practice, so as to provide reference for teaching reform in colleges and universities.

1. Introduction

With the in-depth integration of classroom teaching and information technology, education models supported by emerging technologies such as SPOC and Rain Classroom have developed into the mainstream. It is an inevitable trend for online and offline teaching to be combined with network intelligence platforms. SPOC is a branch of MOOC, which can solve the needs of personalized learning and provides a teaching environment for teachers. Rain Classroom is an emerging teaching tool in recent years. Through the integration of information technology into the use of WeChat-courseware, it has bridged physical classrooms and online learning, effectively integrating pre-class, in-class, and after-class teaching, and providing ideas for overcoming the drawbacks of traditional teaching ^[1-2]. Medical physics is an emerging subject that intersects medicine and physics, which has laid a necessary theoretical foundation for contemporary medical college students to master relevant professional skills.

2. Teaching design research

Based on related theories, with the assistance of new teaching methods SPOC and Rain Classroom, teaching design has been optimized and implemented, so that the course will show a broader vision, deeper connotation, and more distinctive content system.

2.1 Supporting theory

2.1.1 Student cognitive theory

The term “cognition” is regarded as the process of individual acquisition, processing, storage, and extraction of information in cognitive psychology. Learning is the establishment of learners’ self-cognition structure, to master knowledge from the levels of understanding, application, and re-creation through self-decision-making, self-encouragement, self-supervision, self-assessment, self-evaluation and self-feedback ^[3]. A qualified university teacher should follow the cognitive theory of students and start teaching step by step. Based on the aspects of “why to learn, how to learn, when to learn, what to learn, where to learn and learn with whom”, they should explore students’ learning motivation, learning methods, learning time, self-awareness of learning results, and sensitivity to the environment. Cognitive theory emphasizes the dominant role of students, and strengthens the enlightenment of learning environment, student interaction, and smart platform to improve teaching effects.

The information tools provided by Rain Classroom have created intelligent equipment terminals

that connect teachers and students, and established a multi-functional, all-round, and full-process interactive platform between teachers and students, which promotes students' cognition and helps teachers achieve interactive and precise teaching. Therefore, in curriculum teaching design, teachers should not only pay attention to learning resources and learning methods, but also pay attention to the design of learning activities and learning strategies.

2.1.2 Core ideas of teaching

On the one hand, adhere to students' dominant position and teachers' central guiding philosophy. The teaching design, based on a main context, divides knowledge points into countless branches, uses the teaching idea of "a string of fragmented knowledge", focuses on research learning, and establishes ability-building courses.

The teaching model, relying on knowledge points, divides it into several learning tasks, including task objectives, question lists, study guides, tests and reflections, integrates teaching objectives and content, and reflects the knowledge and abilities required to be cultivated in the syllabus. The teaching model changes the sequence of knowledge transfer and knowledge acquisition, realizes the "teacher-led, student-oriented" teaching goal, expands the single learning method to independent learning, collaborative learning, and diversified learning methods of inquiry learning, and improves the classroom to the height of in-depth inquiry, speculation and practice.

On the other hand, based on strengthening moral education and cultivating people, adhere to the education goal of "Three-wide Education".

Education should not only focus on results, but ignore process. It should focus on the all-round development of students. Adopt a diversified evaluation model, combine process evaluation and formative evaluation, and use smart platform technology to collect and analyze student learning behavior data, and then provide data support for targeted teaching. At the same time, teaching design should, driven by high-level and challenging tasks, seamlessly link the curriculum ideology and politics, help students establish the correct views on world, life and values, and cultivate high-quality talents for the country.

2.2 Teaching design framework

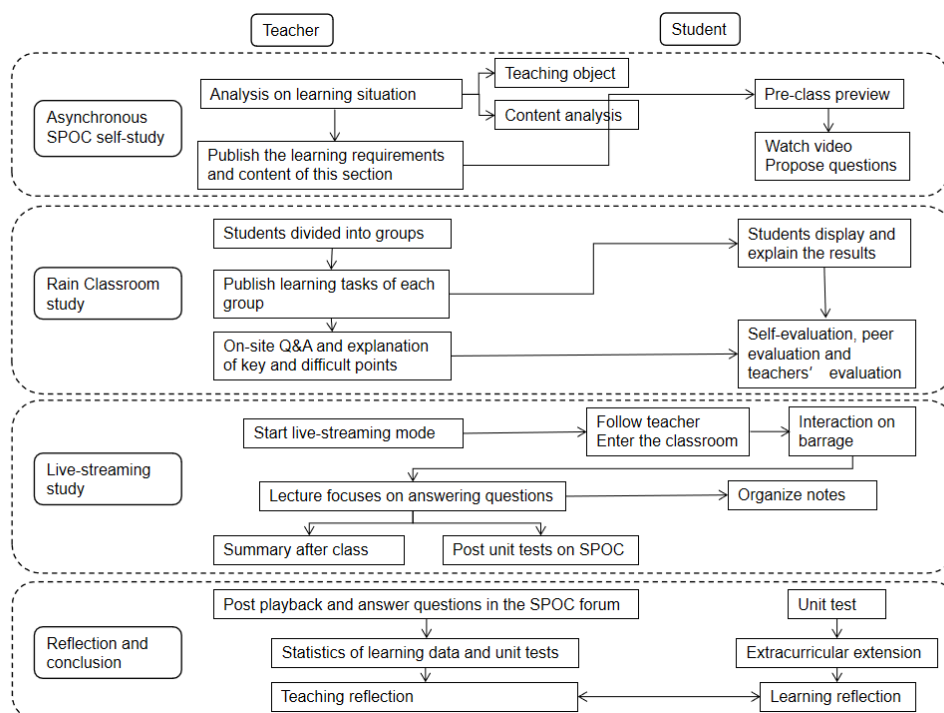


Figure 1

Asynchronous SPOC self-study: This course uses the asynchronous SPOC course of MOOC in Chinese colleges and universities. The source course is "Medical Physics" of Shandong University.

Teachers publish the learning objectives and video content of the course in advance, and distribute electronic textbooks, PPT and other learning materials. While watching the video, students ask questions and send them to the teacher.

Rain Classroom cooperative teaching: The teaching takes students as the main body, teaches the thinking context and learning methodology, and uses heuristic and guided teaching. Adopt the learning method of “a string of fragmented knowledge”, and organize teaching activities around the main thread. Mainly check the learning results and answer questions, with focused explanations. Students display their learning achievements in the form of study notes, focusing on the recording and sorting of learning content, as well as orderliness, induction, characteristics, and expansibility. Supervise and encourage students to dig out surface knowledge and its deep meaning.

Live-streaming teaching and learning in accordance with their aptitude: In view of the fact that students will have common problems when they explore or do exercises after class, teachers carry out live streaming to assist in teaching. The live streaming can use a combination of PPT live broadcast and handwriting. Teachers choose randomly according to the teaching content and choose the live broadcast method flexibly.

3. Teaching design application and practice-taking “Liquid surface phenomenon and medical application” as an example

3.1 Design of teaching activities

1) Before class-clear goals and independent learning. The organization of pre-class teaching activities is the prerequisite and basis for whether the links in the class can be carried out efficiently. The pre-class design is divided into three parts.

Firstly, according to the characteristics of the current era and the status quo of college students, analyze and explore the academic situation, and issue preview resources (SPOC, related videos of self-made high-quality courses).

Secondly, arrange preparatory discussion questions, work in groups, and cultivate students' teamwork and innovation spirit.

Thirdly, through the SPOC platform, students' preview process and questions are recorded, and the teacher gives feedback according to students' preview from the Rain Classroom to perform detailed teaching design in a targeted manner, and adjust teaching strategies in real time.

2) In class-deep interaction and real-time feedback

Firstly, video introduction. The video shows the real situation of water in the cup without overflowing, realizing problem introduction and heuristic teaching, to elicit specific problems, and train students' ability to discover and solve problems.

Secondly, teacher-student interaction. The most prominent requirement in the class is the interaction between teachers and students with the students as the main body, which highly unifies teaching and learning, and realizes the internalization of knowledge. There are three forms of teacher-student interaction in this section. One is to turn on the barrage submission function of Rain Classroom in class, pay attention to the pages that students do not understand at any time, and solve classroom problems in time. The second is to set up in-class exercises. In this section, the objective questions are set. Students complete the questions within the specified time. The teacher will focus on the important and difficult points based on real-time feedback to improve teaching effectiveness.

Thirdly, curriculum ideology and politics. Curriculum ideology and politics is not a simple adding of courses and ideology and politics, but in the course of teaching, naturally integrating into the curriculum ideology and politics in a subtle and silent way, inspiring empathy among students, and cultivating students' good personal character, moral sentiment, and soundness, and improving students' personality and comprehensive ability.

Finally, knowledge expansion. In the process of focusing on students' professional knowledge learning, we should not ignore the cultivation of divergent thinking. Through scientific knowledge, current events, daily phenomena, etc., stimulate students' desire to explore, provide channels for knowledge expansion, and exercise their independent learning ability.

3) After class-review and consolidation, reflection and summary

Summary and expansion of the learning content in the class should be done after class. According to the data of SPOC and Rain Classroom intelligent platform, we can understand students' learning situation in real time, review and consolidate knowledge points, and arrange targeted after-school tasks (such as self-shooting videos related to surface tension) to cultivate students' practical ability, innovation ability, and comprehensive application ability.

3.2 Analysis on teaching effects

In the first and second semesters of the 2019-2010 academic year, we conducted a pilot teaching case for nearly 800 people majoring in clinical medicine and medical imaging, and conducted multi-dimensional assessments from students' pre-class data, class performance, and after-class feedback, changing from knowledge assessment to ability assessment.

Through SPOC and Rain Classroom, students' pre-class preview and in-class barrage participation are 100%, showing that the classroom atmosphere is more active, and students can take the initiative to complete the pre-class preview; the accuracy of the limited-time small practice in class is 96%, which shows that the classroom effect was effectively improved; after class, students completed the exercises in time, with a passing rate of 100%, and the quality of the homework was significantly better than traditional paper homework. From the perspective of the learning process, due to the accurate positioning of learning problems, the pre-class preview in place, and the efficient after-class evaluation have effectively improved students' interest in learning.

Table 1

	Yes	No	Not sure
Strengthen the recognition of after-school review	83.05%	5.93%	11.02%
Improve learning autonomy	75%	10.38%	14.62%
Help master the knowledge points	84.32%	4.45%	11.23%
Improve knowledge fragmentation learning	77.54%	5.72%	16.74%
Improve learning effect	82.8%	5.38%	11.82%
Enliven classroom atmosphere	92.8%	7.2%	/
Make learning more convenient	96.82%	3.18%	/

3.3 Student evaluation

In this study, 400 students were randomly selected as subjects, and surveyed and analyzed on Sojump. With the support of Rain Classroom, students recognized the teaching mode of "Medical Physics" with a high degree of recognition, and the evaluation was: feeling novel, interactive, innovative, perfect, nice, good, great, okay, etc. In general, they believe that their interest in learning has improved significantly, grades have been improved, and problem-solving ability has been practiced.

4. Conclusion

Today's big data information environment provides an opportunity to reform classroom teaching. This article effectively used SPOC and Rain Classroom to carry out the implementation and application of teaching design, and achieved good teaching effects. There is no fixed method in teaching, and also in learning. College teacher should learn to use educational technology in accordance with the development of the times, maximize the advantages of teaching resources and educational technology, take students as the main body, master wisdom as the goal, follow the teaching rules, and finally achieve good teaching effects and cultivate high-level talents.

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