



Original Article

The learning experience of basic science and clinical dentistry by postgraduate students in Institute of Clinical Dentistry and Institute of Oral Biology



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Received 25 January 2019

Available online 2 April 2019

KEYWORDS

Interdisciplinary;
Medical education;
Panel discussion;
Problem-based
teaching

Abstract *Background/purpose:* Students with different undergraduate trainings may have different responses after taking a combined course with both clinical and basic topics. This study investigated the learning experience of basic science and clinical dentistry by postgraduate students in Institute of Clinical Dentistry (ICD) and Institute of Oral Biology (IOB) after finishing the specific course.

Materials and methods: Semi-structure questionnaire filled by internet process was used. The data were collected and analyzed statistically.

Results: Nineteen participants who took the course of “panel discussion of oral oncology” since 2014 to 2018 were included in this study. Of the 19 postgraduate students, 11 were from ICD and 8 from IOB. Both ICD and IOB students gave high scores for the items such as benefit for the research, appropriateness of the discussion topics, and suitability of problem-based teaching model. ICD students tended to have better fitness of interdisciplinary learning ($P > 0.05$), better understanding of clinical topics (significant, $P = 0.02$), and a higher willing to recommend other students to take the course ($P > 0.05$) than IOB students. However, IOB students tended to have a better understanding of basic science topics than ICD students, although the difference was not significant ($P > 0.05$).

Conclusion: Our problem-based and constructive teaching course and the selected topics are

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proper and helpful for students' future research. The students with the clinical training background are prone to have better understanding of clinical topics, while those with the basic science training tend to have better understanding of basic science topics.

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Introduction

Oral cancer is the major public health problem in Taiwan.^{1,2} The decision of treatment strategy for oral cancer is based on the clinical practice and basic science research.³ Surgery is still the best method to treat oral cancer.⁴ However, the operation-induced surgical defect, even with repairment, and morbidity usually decrease the patients' life quality after operation. Therefore, combination therapy including neo-adjuvant chemotherapy before surgery or combined chemoradiotherapy with intensive modified radiotherapy after surgery is the adjuvant strategy for oral cancer treatment.⁴ Recently, alternative cancer treatment such as cryotherapy and photodynamic therapy is used in treatment of early stage oral cancer^{5–7} or oral potentially malignant disorders^{8,9} and achieves successful outcome. The ongoing oral cancer treatment strategy is immune therapy, which has been used successfully for treating melanoma.¹⁰ Taking together, a good oral cancer treatment is based on not only clinical practice but also basic science research. Interdisciplinary cooperation for oral cancer therapy is the best method to get a good treatment outcome. Thus, it is very important to understand how to train the interdisciplinary students for obtaining a good cooperation for future oral cancer therapy.

The interdisciplinary teaching and learning model for students in Institute of Clinical Dentistry (ICD) and Institute of Oral Biology (IOB) may be the best scenario to mimic the future cooperation pattern in hospital and academic institution. However, how to train the students with different undergraduate training and how to let the students with different background knowledge to learn what they need is a challenge work. In advance, how to create a cooperative scenario to train the interdisciplinary students to learn from each other is a much more complicated issue.

Constructivism is a learning theory, which is found in psychology to explain how people may acquire and learn knowledge.¹¹ This theory is directly applied to education but not a specific pedagogy. The theory highlights that people construct knowledge from experience but not from being taught by teacher's lecture only. The role of the teacher is as a supporter. This theory is popular to be used in children education to teach them how to do the self-learning. However, El Asmar and Mady used a constructivist approach to design teaching in the interdisciplinary postgraduate level.¹² Wright et al. also used the constructivist learning theory within higher education subdiscipline fields in Kinesiology.¹³ It means that constructivist theory may be applied in a wide range and may be used to teach interdisciplinary postgraduate students.

Taking together, in this study the effectiveness of an interdisciplinary problem-based learning in small group

discussion under constructivist theory was investigated. We tried to know the learning experience of basic science and clinical dentistry by postgraduate students in ICD and IOB after finishing the specific course.

Materials and methods

Participants

Nineteen students who took the elective course entitled "panel discussion of oral oncology" from ICD and IOB in School of Dentistry, National Taiwan University, were included in this study.

Teaching process

Interdisciplinary problem-based learning in a small group was the teaching model. The teacher gave a brief introduction on the topics to be discussed next time and submitted some questions. The students from ICD and IOB discussed the distributed questions one another. Moreover, the student should search the literature for the distributed questions and gave a presentation next time. Each topic might contain basic and clinical knowledge. The students then presented the searched data related to the topics according to their academic background or their preferred points of view that they wanted to share with others. The process of the course was based on constructivism.

Survey tool

This study was approved by the Institutional Review Board. Students were invited to join this study as their free will. If they agreed to participate this research, they should sign the informed consent first, and then an internet link was given to the participants to fill out the questionnaire freely without the pressure from investigators. For the prevention of repeated filling, the internet questionnaire was set to be filled once only. Semi-structured questionnaire was used as the study tool. The questions included the basic data collection like the belonging institute (ICD or IOB), the program (Master or PhD), the year joining the course, and the research topic (related or not related to oral oncology). The investigated questions included the agreement of interdisciplinary students joining together in the course, the benefit of learned knowledge to the future research work, the understanding of each discussion topic (clinical-related or basic science-related), the appropriateness of the discussion topics, the suitability of problem-based teaching model for panel discussion of oral oncology, and

the willingness to recommend other students to take this course. In these investigated questions, the answer was designed to let the participant to raise a score ranging from 0 to 100. If the intensity or response for each question was extremely negative, the score was 0. In contrast, if the intensity or response for each question was extremely positive, the score was 100. The participant was suggested to fill the score in flash appearance in mind without hesitation. Final question was an open question. The participants could fill any suggestion and/or opinion (including advantage or disadvantage).

Statistical analysis

All data were analyzed by statistical software program package of GraphPad Prism 6.0 (GraphPad Software, San Diego, CA, USA). The mean scores of various investigated items were compared between ICD and IOB students by multiple *t*-tests. The result was considered to be significant if the *P*-value was less than 0.05.

Results

Demographic data

Nineteen students were included in this study (Table 1). They were from different programs including 17 students from master program and 2 students from PhD program from 2014 to 2018. There were 11 ICD students and 8 IOB students. Of the 19 students, 8 were male and 11 were female (Table 1).

The investigated items

There were seven items being investigated and these included fitness of interdisciplinary learning, benefit for the research, understanding of clinical topics, understanding of basic topics, appropriateness of the discussion topics, suitability of problem-based teaching model, and willingness to recommend other students to take the course. The score for each item was relatively high and all the mean scores of investigated items were over 75 (Table 2). The differences in the mean scores of investigated items were compared between ICD and IOB students by multiple *t*-tests. We found that both ICD and IOB students gave high

scores for the items such as benefit for the research, appropriateness of the discussion topics, and suitability of problem-based teaching model, indicating that our problem-based teaching course and the selected discussion topics are proper and helpful for their future research. In addition, ICD students tended to have better fitness of interdisciplinary learning ($P > 0.05$), better understanding of clinical topics (significant, $P = 0.020$), and a higher willingness to recommend other students to take the course ($P > 0.05$) than IOB students. However, IOB students tended to have a better understanding of basic topics than ICD students, although the difference was not significant ($P > 0.05$) (Table 2).

Open question

There were 6 students (3 IOB and 3 ICD students) who gave their suggestions or opinions for the course. One IOB student agreed with the interdisciplinary learning and indicated that the interdisciplinary learning could enhance the opportunity of interaction one another. One IOB student expressed that she obtained the thinking training for research and knew how to read paper after finishing the course. One IOB and 2 ICD students suggested that the teacher might give more lectures for basic knowledge, such as molecular mechanisms for causing oral cancer and anatomical concepts in clinical topics. One ICD student suggested that the presenter might supply "take-home message" at the end of the presentation to enhance understanding of the topic.

Discussion

In this study, the teaching course was designed for interdisciplinary problem-based learning in a small group, therefore the students' number was not possible to be large. We recruited students to join the course from 2014 to 2018, only 19 students agreed to participate in this study. Because the students' number was small, qualitative judgement of each investigated item was adapted rather than quantitative approach for evaluating relationship among different variables. Every investigated item was judged by the students who then gave a score for each item to express their judgement of the quality.

Problem of problem-based learning (PBL) arose out of educational initiatives in the 1960s. It is one of the most contentious issues in medical education.¹⁴ Even though PBL is mostly followed by Universities in Europe and Australia, it still exists some advantages and disadvantages. One of the disadvantages is student unpreparedness. Many students may not be well prepared to participate in a PBL exercise due to immaturity, unfamiliarity with broad questions, and lack of prerequisite knowledge. In this study, ICD or IOB students expressed that their understanding in unfamiliar basic science or clinical field was relatively low, respectively. Lack of prerequisite knowledge is the major problem for PBL. That may be the reason why some ICD or IOB students give the answer in open question section to express that they wanted the teacher to give more lectures on knowledge of molecular mechanism of oral cancer or detail of oral anatomy for clinical dentistry.

Table 1 Distribution of students in Institute of Clinical Dentistry (ICD) and in Institute of Oral Biology (IOB) by the attended program or gender.

Student	Program	Gender	Number
ICD students	Master	Female	5
		Male	5
	PhD	Female	0
		Male	1
IOB students	Master	Female	5
		Male	2
	PHD	Female	1
		Male	0

Table 2 The mean scores of various investigated items given by students in Institute of Clinical Dentistry (ICD) and in Institute of Oral Biology (IOB) after finishing the course.

Investigation item	Mean score (mean \pm SD)		P-value ^a
	ICD students (n = 11)	IOB students (n = 8)	
Fitness of interdisciplinary learning	83 \pm 27	76 \pm 25	0.573
Benefit for the research	87 \pm 12	86 \pm 14	0.869
Understanding of clinical topics	90 \pm 10	77 \pm 12	0.020
Understanding of basic topics	77 \pm 14	84 \pm 11	0.257
Appropriateness of the discussion topic	90 \pm 6	88 \pm 13	0.657
Suitableness of problem-based teaching model	88 \pm 10	92 \pm 10	0.401
Willingness to recommend other students to take the course	94 \pm 7	86 \pm 14	0.118

^a Comparison of the mean score between ICD and IOB students by multiple *t*-tests.

Constructivist teaching focuses on the self-learning and learning based on the students' need. In this study, both ICD and IOB students enjoyed self-learning. The teaching model in this study was designed to give the questions in various topics including basic science and clinical topics. The students should base on the raised questions to have discussion with their classmates in a small group. Because the IOB students tended to have more knowledge on the basic science, they might provide more basic science knowledge of the raised topic for the ICD students in the discussion. In contrast, ICD students were prone to have more clinical experience, thus they could offer clinical knowledge of the raised topic for the IOB students. Through the mutual help process, both IOB and ICD students could acquire both basic science and clinical knowledge after the discussion. Therefore, we suggest that this specific course may be beneficial for each IOB or ICD student regarding the design of their future research. Moreover, because both the basic mechanism and clinical point view are considered simultaneously in the beginning of the research, the results of their studies may have high potential for clinical use in the near future.

In this study, both ICD and IOB students gave high scores for the investigated items including benefit for the research, appropriateness of the discussion topics, suitableness of problem-based teaching model, and willingness to recommend other students to take the course. These findings indicate that our course, panel discussion of oral oncology, containing clinical and basic science related knowledge is suitable for the interdisciplinary students to learn in problem-based and constructive small group teaching. In addition, our problem-based and constructive teaching course and the selected topics are proper and helpful for students' future research. The students with the clinical training background are prone to have better understanding of clinical topics, while those with the basic science training background tend to have better understanding of basic science topics. Both ICD and IOB students highly recommend their peers to take this course after finishing the lesson.

Conflicts of interest

The authors have no conflicts of interest relevant to this article.

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