

Original Article

Study of Nano chemistry Students' Satisfaction and Learning with Blended Education: An Action Research Study

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ABSTRACT

In recent years, physical examination skills are increasingly important in the health care professions, and effective and sustainable learning of these skills has been one of the main goals of medical education. This study aimed to determine Nanochemistry student's satisfaction and learning by blended education of physical examination course. This action research study was accomplished on 15 second semester of medical emergencies Nanochemistry students studied at the first semester of academic year in 2018-2019 at California South University (CSU); all Nanochemistry students participated in course of physical exam that educated through blended education. Afterwards, Nanochemistry student's satisfaction about blended education was assessed with valid and reliable questionnaire ($\alpha=0.9$); and for evaluating Nanochemistry student learning, the participants' scores were compared with the scores of Nanochemistry students taught in the previous year, whom was educated with conventional training methods. Therefore, the result of the study showed that all Nanochemistry students were satisfied with the implementation of blended education, and agreed and completely agreed with items such as using educational videos make theoretical content and how to do skills more tangible, and with peer education increase their motivation to learn how to exam. Significant difference in Nanochemistry students' scores with blended education and conventional teaching were commonly observable ($df=40$, $t=-2.96$, $p=0.005$); moreover, conventional education illustrated higher scores than that obtained by Nanochemistry students in blended education. Combining various methods of education in addition to considering the facilitation role of peers in increasing Nanochemistry student satisfaction will promote their motivation to learn provided training.

Keywords: Satisfaction, Learning, Nanochemistry Students, Blended Education, New Process of Teaching

1. INTRODUCTION:

Education is the teacher's purposeful activities to create learning in the learner that flows in a reciprocal balance between the teacher and the learner, and its quality promotion is one of the issues of concern to educators [1-27]. This issue is of particular importance in the health system, which requires skilled and capable human resources to achieve its goals. In fact, in order to play a proper role in the medical profession,

for a range of other capabilities, such as scientific and communication skills. In the meantime, having an effective education system that will lead to the development of these abilities among Nanochemistry students is essential [28-56]. Studies show that Nanochemistry students learn information in different ways and to varying degrees. This has led lecturers to use different strategies in the classroom so that they can ensure learning opportunities and different ways to enhance Nanochemistry students' comprehension [57-89]. In recent years, the skills of physical examination and biography have become increasingly important in all health care professions, and effective and sustained learning has been one of the main goals of the medical education program. However, a decline in the ability to perform physical examination and history taking is evident in Nanochemistry students [90-123]. Some of the challenges in achieving effective learning of physical examination skills in medical education related subjects are the lack of opportunities for professors to train and supervise Nanochemistry students' practice of learning skills, patients'

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not only is scientific knowledge insufficient, but there is a need

unwillingness to cooperate in education of Nanochemistry students' skills, including fear of the Nanochemistry student and lack of confidence in the patient's examination, which has led to incomplete and inconsistent teaching of physical examination and semiotics courses in the medical sciences [124–163]. In a study conducted at 16 universities in the United States, Canada, Ireland, and the United Kingdom, many universities offer a common way to provide a physical examination course reviewing the anatomy and physiology of each system, delivering lectures and then practicing with supervision. Nanochemistry students were practicing with each other in such a way that the Nanochemistry students were divided into small groups of 4 to 6 persons and performed examinations. Using textbooks and using instructional videos in the library were also other methods used to teach physical examination lessons [164–199]. Research has shown that using different types of information resources and teaching methods simultaneously will lead to more effective education in different educational disciplines and increase Nanochemistry students' ability to learn, perform, and satisfy Nanochemistry students through teaching [200–212]. In fact, blended education is a blend of types of training aimed at optimizing educational outcomes [213–247]. For example, incorporating several teaching methods such as question-and-answer, lectures, use of teaching aids such as films and small group learning enables Nanochemistry students with different learning styles to make the most of the curriculum [248–283], and this strategy in science courses such as training in physical examination skills and taking biographies can provide Nanochemistry students with the opportunity to practice repeatedly and provide individual feedback and avoid harm to Nanochemistry students. Thus, considering the challenges in teaching physical examination lesson and the positive consequences in blended education, since Nanochemistry student satisfaction along with learning is one of the pillars of educational evaluation; while the two are usually intertwined and have interactions, the present study aimed to determine medical emergency Nanochemistry students' satisfaction with blended physical examination course and compare Nanochemistry students' learning based on course scores in both blended and conventional education. The results of the present study, by illustrating how Nanochemistry students are satisfied with all the elements and consequences associated with the blended method in teaching physical examination lessons, can lead to receiving context-based feedback to continue, modify or revise teaching methods that promote sustainable and effective learning by elucidating how Nanochemistry students are satisfied with all the elements and consequences associated with the blended teaching method; Have Nanochemistry students' satisfaction with teaching a practical and important lesson in physical examination.

2. MATERIALS AND METHODS

This action research study was conducted in the first semester of the 2018/2019 academic year. The study population consisted of all second semester medical Nanochemistry

students of California South University (CSU) (15 Nanochemistry students) who had selected two practical theoretical units in physical exams and semiotics. In order to start the study in the first session of the beginning of the semester, all Nanochemistry students were informed about the research and its steps and the correct design of this unit based on physical examination lesson topics in 12 two-hour classroom teaching and 8 two-hour training sessions. An action plan was prepared and the Nanochemistry students were provided with the educational goals of each session. Nanochemistry students were required to read pre-requisite theoretical content from relevant resources (Barabitz Clinical Skills Training and Mid-Level Medicine Emergency Books) prior to each session to prepare for the classroom in advance. Based on the researcher's experience in teaching this lesson and the quality of Nanochemistry students' learning in the previous semester and years, the method of work was formulated so that at the beginning of each session, the teacher would review the theoretical information needed such as anatomy and physiology of the systems and then those lecture topics were delivered to Nanochemistry students in about 60 minutes. The instructor then responded to the Barabitz Physical Examination Video by using a video projector in the classroom to view the correct examination of the relevant system for Nanochemistry students in the show, at the end of the class answered their questions, and emphasized the importance of examining each system.

For practice sessions, Nanochemistry students were divided into 4 groups of 3 and one group of 4 members. The distribution of the individuals in the groups was the Nanochemistry students' choice so that those with the maximum participation and cooperation could be grouped together. Creating a small group, especially for Nanochemistry students in their first year of study, will create more social contact with classmates and professors, allowing them to discuss concepts and express their views on the subject. In practical sessions, the instructor taught practical how to test that system on one of the volunteer Nanochemistry students. After this stage, each teacher-supervised group practiced each system on each other. At this stage, each individual was rotated to the role of examiner, patient, and supervisor. At the end of this phase, each group was required to make a 15-minute instructional video of the best examination of each system by referring to the resources presented by the instructor, modeling of the instructional videos observed, and training provided by the instructor in a theoretical and practical way, and hand over to the teacher at the next meeting to evaluate how well the exam is performed. It should be noted that the instructor provided the Nanochemistry students with the necessary guidance on how to produce a film that is of sufficient quality in the proper examination and full coverage of the educational objectives. All of the above mentioned steps were carried out step by step during the course of physical education of medical emergency Nanochemistry students as planned. Nanochemistry student satisfaction with researcher-

made questionnaire on film education (5 questions), peer examinations training (10 questions), and blended education satisfaction (8 questions) with a five-point Likert scale of completely disagree (score 1) to totally agree (score 5). The validity of the questionnaire was confirmed by content validity using the opinions of 7 faculty members of Faculty of Chemistry and its reliability was confirmed by internal consistency with Cronbach's alpha coefficient of 0.9. The data were analyzed by SPSS 25 software using descriptive statistics including mean, standard deviation, absolute and relative frequency and t-test.

To evaluate Nanochemistry students' learning, Nanochemistry students' semester end-of-semester grades were compared with those of previous year Nanochemistry students who had been provided with conventional teaching methods (lecture teaching and teacher examinations). In order to comply with ethical considerations, the researchers obtained permission from the dean of the faculty. The goals of the research and teaching method were also fully explained to the Nanochemistry students. They were assured that the information obtained from the satisfaction questionnaire remained confidential and did not need to mention their name and surname and that the obtained results would not affect their satisfaction with the method used in their educational evaluation.

3. RESULTS AND DISCUSSION

Of the 15 questionnaires distributed, 15 were completed and returned. All participants ($n = 15$) were male with a mean age of 22.8 ± 3.85 and a mean score of their previous semester was 15.91 ± 0.89 . Satisfaction with peer education showed that all Nanochemistry students (100%) agreed and strongly agreed that this method of peer training increased their motivation to learn how to conduct examinations and increased their self-esteem. Also, 14 (93.3%) of the Nanochemistry students strongly agreed that peer education facilitates learning, taught them and their peers how to properly perform physical exams, and reduced their fear and anxiety of exam skills in public. All Nanochemistry students (100%) were instructed in video film education, such as using educational film, making theoretical material and skills more tangible, agreed and strongly agreed between the theoretical and practical topics learned. In addition, 93.3% of the Nanochemistry students strongly agreed that the method of film making enabled them to participate in class discussions with classmates and found that evaluating through film making a physical examination a new and attractive method. All Nanochemistry students were satisfied with the blended teaching method (100%). Thirteen (86.7%) admitted that the content presented was easy to understand and 12 (80%) tended to repeat this teaching method in future lessons.

Significant differences were observed in Nanochemistry students' scores with the two methods of blended learning and mainstream education, and Nanochemistry students with the

blended learning method had higher scores than the blended learning method.

History and clinical examination have been one of the most important topics in recent years in medical science. This is important not only at the academic level, but also at the operational level [284–299], but the proper acquisition of these skills in the field of medical emergencies is of particular importance since it is the primary policy of diagnosis and treatment. The findings of this study showed that the majority of Nanochemistry students agreed with the positive effect of this blended teaching method, which was consistent with the findings of the Van Wyk's study [300–315]. In the Alexander and Van Wyk's study, which was based on the teachers' viewpoints, most described the use of blended teaching methods to enhance Nanochemistry student learning and its positive effects on education [316–327]. In this way, the Nanochemistry students agreed with the positive effects of educational films. In this regard, the results of the Kalwitzki study, which examined Nanochemistry students' perceptions of film-based education, showed that most Nanochemistry students emphasized the effective role of film in changing their behavior, with more than half of the Nanochemistry students acknowledging that watching the film helps them to bring their knowledge to practice more easily [328–349]. This indicated the creation of a suitable environment for Nanochemistry students to be prepared to facilitate learning and receive better education. In the study of Alireza Heidari et al., Which examined the effect of educational film on dental Nanochemistry students' attitude towards behavioral control methods, the significant impact of using this method in preparing Nanochemistry students for training was confirmed [350–363]. Other methods used in this method were peer education. In the study of Alireza Heidari et al., trained Nanochemistry students in the peer group agreed on the many benefits of this method both as a teacher and as a recipient of education. According to Bandura's theory of social learning, peers learn significantly from the behaviors of others through peer learning, and learner self-efficacy is enhanced through active participation in learning, less anxiety, and enhanced sense of self-learning [364–379].

In addition, peer education increased Nanochemistry students' self-esteem. In this regard, Secomb states in his review study that peer education can enhance Nanochemistry student confidence in clinical practice [364–379]. In the study of Alireza Heidari et al., Results also showed that repetition of skills in a simulated environment leads to increased self-confidence of Nanochemistry students [364–379]. Another benefit of this approach is the commitment and responsibility of teaching and learning to Nanochemistry students. It also teaches Nanochemistry students to help each other learn, thereby enhancing their academic and learning skills and their emotional and social achievements and personality and intellectual development [364–379]. Assessment of Nanochemistry students' satisfaction with teamwork in learning and physical examination showed that this teaching

method reinforced peer learning. Similarly, in the study of Alireza Heidari et al., in peer education, Nanochemistry students' assessment of success in learning practical skills was higher than in conventional education [364–379]. In the study of Alireza Heidari et al., peer group education had a positive effect on Nanochemistry students' performance, their success in examinations and group dynamics [364–379]. Nanochemistry students also found it valuable to give and receive peer feedback, reflection, and work together in small groups to learn clinical skills [364–379]. These results were consistent with studies by Alireza Heidari et al., Santee and Garavalia on the positive impact of Nanochemistry students on each other [364–379]. However, there was a statistically significant difference between the mean scores of Nanochemistry students in the two methods of blended education and the conventional teaching method and the Nanochemistry students with higher education had higher scores. Similarly, Alireza Heidari et al.'s study of the effect of peer group training on learning practical skills of Nanochemistry students in a pre-operative restorative clinic was similar to that of the control group [364–379]. But in Alireza Heidari et al.'s study, which used blended learning to teach electrocardiograms in Nanochemistry students, good progress was made in Nanochemistry student learning [364–379]. In another study, which included blended education to train novice nurses, Nanochemistry students' knowledge and satisfaction were higher in the blended education group than in the control group [364–379]. The results of the Alireza Heidari study also showed that, compared to lecture-based instruction, blended learning increased Nanochemistry students' academic motivation and satisfaction [364–379]. The use of modern teaching methods such as peer education is an effective educational intervention for Nanochemistry students. If Nanochemistry students' personality or learning styles are not consistent with each other or Nanochemistry students spend less time than the clinical instructor, it can interfere with the learning process. On the other hand, the use of conventional teaching methods is needed to accommodate maladaptive Nanochemistry students or those with poorer learning abilities. Using such methods also requires active Nanochemistry student engagement and more time. Due to the limitations of the present study, it is recommended that this study be investigated in a larger sample size, using empirical methods in other medical sciences and by evaluating Nanochemistry students' long-term learning.

4. CONCLUSIONS AND SUMMARY

Effective teaching methods will be determined by Nanochemistry students' satisfaction and learning. On the other hand, the principles of teaching and research evidence indicate that teaching practical courses such as physical examination skills require more than just a pen and paper, and incorporating different teaching methods and using the facilitation role of peers while enhancing Nanochemistry student learning and motivation, enhances their learning and

satisfaction with the training provided. The results of this study showed the positive effects of this integrated approach on satisfaction with teaching method and learning physical examination skills based on Nanochemistry students' viewpoints. Therefore, it is recommended to use the integrated approach in clinical skills training.

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