

The effects of students self-learning of videotape on administering intramuscular injection

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Abstract Aim: To compare the effectiveness of teaching method between a videotape approach to teaching of intramuscular injection and the conventional teaching approach. Methods: A quasi-experimental study was adopted and the first year Bachelor of Science in Nursing students were recruited during the second semester from September to November, 2005. Subjects included 47 students which divided into two groups, the control group and the experimental group, by random allocation. A lecture on intramuscular injection was conducted to the control group with conventional teaching approach and the experimental group on self-learning basis. Results of students' feedback and their usage of the learning resources of the two groups were compared. Results: The study showed that there was no significant difference on the results of the skill competence between the two groups. Many students felt that the videotape learning could enhance their self-learning ability and allow more flexibility in terms of time for learning at their own pace. However, subjects of the experimental group reflected lacking the confidence to practice the IMI skills by just learning via videotape teaching method.

Key words Videotape teaching Intramuscular injection

1. Introduction

Health care providers have the responsibility to keep up with current medical technology and the health professional knowledge in their workplace continuously for improving quality of care and nursing development. To motivate up their self-learning, the nursing educators must design appropriate stimulus by mean of instruments and strategy in the Nursing program to help the nurse students to develop their self-learning ability for their whole life (Majumdar, 1996). The trend in the nursing development delivers the updated information of the different accelerated courses at all levels of nursing education through wide use of video and other computer-based techniques (Potempa, Stanley, Davis, Miller, Hassett, & Pepicello, 2001).

2. Aim of the study

The aim of the study was to examine whether the recorded nursing skills on videotape (experimental group) was an effective self-learning instrument for the undergraduate nursing students and compare with the conventional lecture (control group) to find out what advantages and disadvantages by using videotape teaching method for IMI procedure.

3. Methodology

It was a quasi-experimental research using an experimental group (group with videotape teaching method for intramuscular injection (IMI)) and the control group (group with conventional teaching mode) for comparison between their learning motivation before teaching and the time consumption on learning the IMI skills, time for interaction during the learning process, result in the practical examination on IMI techniques and level of satisfaction during the learning process after the practical examination.

47 Bachelor of Science of Nursing (BSN) year one students were selected from Kiang Wu Nursing College of Macau who would have undertaken the learning of IMI techniques in the Fundamental Nursing subject in the coming semester. They were then randomly assigned to either the control group or experimental group. In the control group, subjects were to be given a 2-hour lecture and laboratory demonstration for IMI techniques whereas the experimental group was to be given a videotape that displayed the IMI techniques for instruction.

The researcher obtained the approval from the Kiang Wu Nursing College of Macau research and ethical committee. All the participants were informed of the procedure and signed up the consent form after they accepted to join in this research. In order to ensure that the process is no harm to the students, the model is used for the students to the practice and examination.

After the examination, the lecturer gave some comments and guides to students for improving their IMI skills. If some of them who can not pass the examination, the lecturer would give them a lesson to help them to reach the skills requirement. All the data collected would keep anonymity and assure of uses only in the data analysis process. It would be destroyed one year after the publication of results.

A pilot study was carried out in March to June 2005 to testify the administration of the instruments as well as the feasibility of the study. Data collection was launched from September to November, 2005. Firstly, demographic data sheets and Biggs' Study Process Questionnaires (SPQ) were given to all the subjects. Then the experimental group was given a videotape or VCD concerning the learning skills of IMI and practice in the laboratory in their own pace and choice of time. They were allowed to take it home for self-learning. For the control group, they had to attend an hour lecture for IMI procedure. Immediate after the lecture, subjects would have practices in the laboratory with their demonstrators. In the following week, all the subjects were required to complete a learning diary regarding the practice on the laboratory of previous week. During this period, all the subjects can book laboratory practice demonstrators' supervision until they felt confident with respective nursing skill. At the end, both groups were assessed with the checklist by one rater. Their learning diaries were also submitted to the researchers.

The confounding factors were the learning ability. In order to control this factor, we gave a SPQ test for all the students before the research. Result of the SPQ showed no significant difference between two groups on the learning strategies and learning motivation would reject this factor.

4. Instruments

Three instruments were used in this study that included the SPQ, checklist of the IMI techniques and the reflective journal.

SPQ was a self-report questionnaire. It consists six sub-scales that were surface motivation (SM), surface strategy (SS), deep motivation (DM), deep

strategy (DS), achieving motivation (AM) and achieving strategy (AS). Each sub-scale has seven items, totally 42 items which rated on a 5-point scale, from 1 = "this item is never or only rarely true of me" to 5 = "this item is always or almost always true for me". It was widely used instruments for nurse teachers to gain knowledge about student-nurse's approaches to learning. Reliability measures of the scales and sub-scales of the questionnaires demonstrated Cronbach α ranging from 0.5 to 0.7. (Snelgrove & Slater, 2003).

An Objective Structure Clinical Examination (OSCE) is defined as "an objective method of assessing a student's clinical competence where the areas tested and the evaluation criteria are in advance from course content and objectives". Forty-seven subjects attended to the OSCE at the end of the learning process. The subjects were expected to perform the skills safely and adequately. All the subjects were evaluated by the same tutors who did not know the group of subjects. The criteria using in OSCE was checklist of the IMI procedures that was to examine the effectiveness of the learning outcome and reflects of what the students know.

To ensure the criteria of the IMI checklist is suitable to Macau's situation, the researchers invited five nursing experts to validate the questionnaire. The questionnaire contained four categories and included 31 items. Each item has three grades those are "Right", "Wrong" and "Not realize". This checklist is referred from the same checklist from the Polytechnic University of Hong Kong that they used it to the BSN students for ten years and certain consistency and equivalence reliability. The evaluation of the index of content validity (CVI) tabulated to be 0.8. The item "Use disposable gloves if necessary" was suggested deletion.

Learning diaries could reflect the thought and feeling of the students. All this information helped to give feedback to individual students. For assessing the learning outcome, the researchers designed the reflective learning diary list according to Chickering & Gamson (1987)'s seven principles for good practice in undergraduate education that were used for evaluating the quality of teaching and learning in undergraduate education. These included active learning, prompt feedback, time on task, diverse talents and ways of learning, collaborative learning, high

expectations and faculty-student interaction (Chickering & Gamson, 1987). The reflective learning diary list was divided into two parts. The first part included the time and resources that they used in the learning process, and the interaction among peers, instructors and themselves. The second part was the questionnaire with two closed questions and three open-end questions about their feedback and suggestion for the teaching methods.

5. Data analysis

All the statistical analyses were conducted using the SPSS statistical package version 11.0 for Windows for descriptive analysis. Chi-square and paired *t*-test was used to compare the differences between the two groups. For their learning dairy record, the quantitative data was to examine difference between two groups for means of the time, the learning methods and the interactions with others and the grades of their feelings during the learning process. Student feedbacks with qualitative information were analyzed by counting the frequency of different comments and suggestions.

6. Results

47 students with 4 male and 43 female at age of 17 to 20 were recruited in this study. They were randomly divided into two groups. 27 were in experimental group and 20 were in control group.

The comparison of two groups in the SPQ scores would be done before the intervention. While using *t*-test comparison, there were no significant differences between the two groups in all six sub-scales. It reflected that the learning abilities of the students at the onset point had no distinctive differences.

6.1 Time consumption and interaction on learning the IMI skills

The mean of the total learning process was 7.3 hours including two lecture hours for the control group and 6.1 hours for the experimental group as shown in Table 1. Significant results were shown in three items of the self-learning dairy ($P = 0.05$) including "practice room time", "interaction with peers" and "interaction with instructors". The VCD group students spent more time to practice the IMI skills in the laboratory room, and interact with the peers than the lecture group. Vice

versa, the lecture group spent more time to interact with instructors.

Table 1 Comparison of groups on the time consumption and interaction during the learning process

Variables	Control		Experimental		<i>t</i>	Sig. (2-tailed)
	group(n=20)		group(n=27)			
	mean	SD	Mean	SD		
Practice room time	0.6350	0.6106	1.1630	0.9241	2.21	0.032
Use of different methods	5.6000	2.9903	4.8815	4.8847	-0.58	0.56
Interaction with peers	0.4100	0.9153	1.0926	1.0759	2.28	0.027
Interaction with instructors	1.3150	1.0001	0.0852	0.3219	-6.00	0.00
Total time consumption in the learning process	7.3250	3.20918	6.0593	5.90328	0.45	0.458

6.2 Practical examination results on the skills of IMI

For the result of OSCE, all of the students passed the test in the nursing laboratory. There was no significant difference between control group and experimental group in result of the IMI skills.

6.3 Level of student satisfaction

According to the depiction of the descriptive diaries, 19(70.4%) students of experimental group reported that they could have more flexibility to arrange place and the time for tutors. 14(51.9%) students felt that could help them to cultivate their self-learning ability. For the control group, 13(65%) students felt that they can not see the procedure very clearly (Table 2).

For qualitative comments, many students suggested having muscular model display to show the injection point first and insert some concrete contents. They also recommended a debriefing session commenced at the end of VCD display was necessary. Six students suggested that using the VCD display during the lecture was the best way for them to learn the skills.

Table 2 Feedback on the method of learning

	Experimental		Control	
IMI skills with this method?	group (n=27)		group (n=20)	
Flexibility to arrange place and the time for learning the skills	19	70.4%	2	10%
Improve the ability of self-learning	14	51.9%	1	5%
Student can ask the teachers directly	0	0%	20	100%
The learning material is very clear	0	0%	7	35%
Easy forgot the steps of the procedure	10	37%	13	65%

7. Discussion

According to the Chickering & Gamson (1987)'s seven principles to improve best practice in undergraduate education, there were some suggestions in response to the findings.

7.1 The choose of the learning methods

The result showed that the advantage of the videotape teaching could provide students more flexibility in the learning process and give chances for cultivate self learning in the way to life long learning. With the rapid economical development in Macau, there is an increase in population and shortage of nurses is expected. The ratio of nurse to the population is 1: 489 which give rise to the need to educate more nurses to meet with the health care demand. It is a matter of fact that demand is greater than supply, education institutes have to expand the class size within limited resources. The results have proved that multimedia can be a useful method to provide the fundamental and high profile skills besides conventional lecturing. It is also with similar trend in the nursing development of undergraduate education during the mid-1960s to early 1980s in western countries. The use of videotape is one of the teaching methods for a large-enrollment of undergraduate students such as 300~500 or other distance education development. It is an effective strategy to make balance with the social development, keep up with the teaching quality, cut the costs down and improve productivity (Pipes & Wilson, 1996). In nursing education today, it is important to provide the students adequate and appropriate materials for self-learning. The methods should encourage students' interaction with peers. However, the participants were the BSN year 1 students. They were used to learning the skills in conventional lecture and not by self-studying for fearing that it would affect their confidence of skills learning. The results also reflected that they would like to combine these two methods. However, several studies addressed that adding the video just the extra expense to the class teaching because it could not add greater satisfaction or greater learning to the students (Berner & Adams, 2004). The results indicated that using the videotape as a self-learning material and arrange the time for tutorial is good for the students learning and foster the

interaction between the teachers and students.

7.2 Time consumption on task and videotape learning

In this study, researcher found that students using the video might save more time in learning the same skills and reduce the lectures' workload that supports the hypothesis and the literature reviews (Pipes & Wilson, 1996; Woo & Kimmick, 2000). In addition, it should give some challenges for the students for self-learning at their own pace. This method is economical and to avoid the difficulty in large group demonstration.

7.3 Quality of the videotape and prompt feedback from students

The students' evaluation and suggestion are valuable to improve the quality of the videotape teaching. Though video-based learning as reflected in the study may not be the perfect mode for in-depth learning, it is still a kind of innovative teaching mode other than conventional lecturing. At present, it still needs room for improvement in the production techniques. Besides, students in the experimental group felt that the information was inadequate. They expected to have nursing instructor's explanation in learning resource with the videotape. It was suggested that teacher could use web-CT to enhance mutual communication and interaction. Hence, this study provide a platform for its first experiment and continuous quality improvement would follow to refining the videotape teaching methodology.

7.4 Limitation

Macau is a small region containing only two nursing colleges. There are 70~80 graduates from these two colleges each year. This is the limitation of small sample size in this study. The Kiang Wu nursing college of Macau is the only institution to providing generic bachelor degree in Macau in its developing stage. The video was not accustomed by nursing professionals and the disadvantage would be addressed in the students' feedback. All the participants were selected from one class that might have the possibility of data contamination due to peer communication in the learning process.

8. Conclusion

The positive results showed that videotape teaching was an effective way for students to learn hand-on nursing skills, cultivate their self-learning

ability and allow the students learn in their own pace. In order to maintain a high standard of the video production, feedback is always necessary for revising the content. As it was the basic courseware, designer need to pay special attention to the advantages and disadvantages, not only improving the quality of education but also gives direction for further research to refine the resources. The project has been a research endeavor for the researchers. By completion, the researchers found that there were flaws in the process. Lack of depth and breadth in the literature reviews and limited sample size. Researchers would also like to share the results with the reader and hopefully the findings would provide scientific data for the effects on using videotape in nursing education.

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學生透過錄影帶自主學習肌肉注射操作之成效

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摘要 目的：比較學生透過錄影帶自主學習與傳統教學法對肌肉注射操作之成效。方法：採用類實驗研究法，一年級47名護理學學士學位課程學生於2005年9月到11月參與研究；學生以隨機分配的方式分為對照組和實驗組。對照組以傳統的教學模式教授有關肌肉注射操作的內容，反之實驗組則採用錄影帶自主學習方式。最後以兩組學生的回饋及學習資源的使用進行比較。結果：研究顯示兩組學生對肌肉注射操作的能力並沒有明顯的分別。大部分學生反映透過錄影帶學習可增強個人自學的能力，能夠更有彈性地學習。但實驗組的學生反映由於只是透過錄影帶自學，在實際練習肌肉注射技巧時缺乏信心。

關鍵詞 錄影帶教學 肌肉注射