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RESEARCH ARTICLE

The Impact of Technology Enhanced Learning and Teaching on the Knowledge, Attitude and Practice of Maternity & Newborn Health Nursing Students in Beni-Suef University

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Abstract

Background: The past few years have seen rapid advances in communication and information technology, and the pervasion of the worldwide web into everyday life has important implications for education. Most nursing schools provide extensive computer networks for their students, and these are increasingly becoming a central component of the learning and teaching environment. Such advances bring new opportunities and challenges to nursing education, and are having an impact on the way that we teach and on the way that students learn, and on the design and delivery of the curriculum. **Aim:** assessing the impact of technology enhanced learning (TEL) on maternity nursing students' knowledge, attitude and practice of a part of the tutorials. **Subjects and Methods:** Maternity health nursing students were randomly allocated into two groups; group A was admitted to TEL lectures and group B was admitted to regular traditional lectures. A well designed questionnaire and a checklist were used to evaluate the knowledge, attitude and practice of students regarding the stages of labor before and after the courses. **Results:** Students who were admitted to the specially designed TEL lecturing program showed significant improvements in their attitude, knowledge and practice scores (P value < 0.001). The scores of knowledge, attitude and practice of those who were admitted to TEL lecturing program were significantly higher than those who were admitted to regular traditional lectures given by the same lecturers (P value < 0.001). **Conclusion:** TEL lectures were proved to offer learners control over content, learning sequence, allowing them to tailor their experiences to meet their personal learning objectives.

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INTRODUCTION

The term Technology Enhanced Learning (TEL) is used to describe the application of information and communication technologies to teaching and learning. In education it is often taken for granted that technologies can 'enhance learning' and the term Technology Enhanced Learning is increasingly being used not just in Europe and the United States but in other parts of the world as well. Referring to the application of information and communication technologies to teaching and learning, TEL subsumes the older term 'e-learning', which was used with a confusing variety of meanings.¹

Within this context, TEL is used to provide information for students e.g. notes, presentations, video, audio, assessment guidelines and basic administrative functions such as scheduling and announcements.¹⁻⁵ TEL also

enhances the quality of learning through interactive learning activities. E.g. tools such as discussion forums, wikis, blogs, virtual classrooms, online quizzes used to support communications and collaboration, assessment and course management. Moreover, TEL approaches combine technology-related and face-to-face activities. These were aligned with the best practice to enhance the student learning experience.⁵⁻⁷

Since the 1990s there has been considerable growth in the adoption of technology within higher education. Using technology can be costly, not only in terms of the financial investment made by institutions for infrastructure, equipment and technical support staff, but also in relation to the personal investment made by staff and students in using the technology for teaching and learning. Despite the widespread growth in practice, concerns continue to be expressed about the extent to which effective use is being made of technology to improve the learning experience of students.¹⁻³

The sharing of 'good practice' and 'lessons learned' among members of the higher education community can help academic teachers to concentrate on effective uses of technology and to avoid the unnecessary duplication of effort and expense. Although most TEL projects are relatively small-scale and context-specific, the cumulative lessons learned from a number of similar interventions can provide a useful indication of benefits that might be achieved.¹⁻³

Besides, there is clear evidence that innovative educational technologies, especially TEL provide opportunities for health and social care students, trainees and educators to acquire, develop and maintain the essential knowledge, skills, values and behaviors needed for safe and effective patient care.¹⁻⁷ Consequently, integration of TEL into mainstream education and training is crucial in improving patient outcomes, safety and experience.

In consistence with these innovations, the adopted policy of Beni-Suef University is built on the cornerstone that higher education students of the future should have an excellent teaching and learning experience, informed by up-to-date research and facilitated by a high quality learning environment, with state-of-the-art learning resources, such as libraries, laboratories, and e-learning facilities.

Aim of the Study

The goal of our study is to propose to develop a TEL hub which would show and share successful examples of TEL in action making accessible resources being used in high quality education, training and development in clinical and educational settings. On the level of short term objectives, the study compares between the effect of TEL lecturing and regular traditional lecturing regards the attitude, knowledge and practice of students attending the Faculty of Nursing, Beni-Suef University.

Subjects and Methods

Subjects: Precisely, 120 students attending the third year, studied maternal and newborn health nursing at first semester academic year 2014/2015, at the Faculty of Nursing, Beni-Suef University took part in the study. Those students were randomly allocated into two groups. Group "A" students were admitted to TEL lectures with audiovisual aids while group "B" students were admitted to the same topics but using the traditional regular lecturing tools. The students were evaluated for their attitude, knowledge and practice regarding the stages and process of labor before commencing the courses and the effect of both types of lecturing was further evaluated after the end of the courses. The study considered that the same lecturers taught the same topics; first for group A using the enhanced technology techniques and audiovisual aids to simulate the different stages of labor, then for group B using the regular stereotypical lecturing tools.

Methods: A simple, comprehensive, well designed questionnaire was introduced to 12 students as a pilot study. The questionnaire was also reviewed many times by the authors and other professors for relevance, validity, simplicity and coherence. Feedbacks of the students and the professors were collated and considered in the second version of the questionnaire to evaluate both the attitude and the knowledge of the participants.

Our questionnaire firstly asked about some socio-demographic facts of the participants to exclude any confounding effect. Then, the attitude of the students was detected by three questions with a total score of 9. Further, the knowledge of the students about the definition, prodroma, signs and mechanism of labor were evaluated. Besides, signs and mechanism of placental separation were also evaluated using this questionnaire with a total score of 80.

Using a checklist which covers all aspects of practices regarding labor process in addition to newborn care, the students were evaluated for their practice in the first, second and third stages of labor with total scores **22, 48** and **22** respectively.

The previously mentioned evaluations were performed for the both groups twice; before commencing the TEL and regular traditional courses and after the end of both courses. Unifying the conditions of evaluation was highly considered to avoid study bias. The TEL lectures were specially designed to guarantee the participation of the students throughout a well designed simulating programmes supported by audiovisual aids to stimulate all sensations of the students at the same time and enhance the active involvement in the course and consequently better understanding and practice. Furthermore, TEL support included workshops, information sessions, seminars and symposia that were scheduled over the period of the course.

It is also worth pointing out that evidence-based practice is crucial for TEL because it ensures that learning is enhanced by technology in practice, as well as in theory. However, the methods for assessing educational impact have to be carefully chosen and appropriate to the innovation. Previous literatures suggest that 'randomized trials are generally the most reliable tool we have for finding out which of two interventions works best'.^{2,14} Meanwhile, our study was designed to be a prospective randomized controlled trial on a cohort of nursing students in order to better assess the effect of TEL lecturing on the knowledge, attitude and practice of our students in comparison to the already existent lecturing tools.

Statistical analysis

Data were analyzed using the software, Statistical Package for Social Science, (SPSS) version 19. Frequency distribution with its percentage and descriptive statistics with mean and standard deviation were calculated. Chi-square, t-test, correlations were done whenever needed. P values of less than 0.05 were considered significant.

Results

A total of 120 students attending the third year, studied maternal and newborn health nursing at first semester academic year 2014/2015, at the Faculty of Nursing, Beni-Suef University participated in the current interventional study. Of them, 43 (35.8%) were living in urban districts while 77 (64.2%) were living in rural districts (Figure 1). Fifty one (42.5%) students stated that they had nursing related jobs besides attending the faculty (Figure 2).



Figure 1: Residence of the participating students

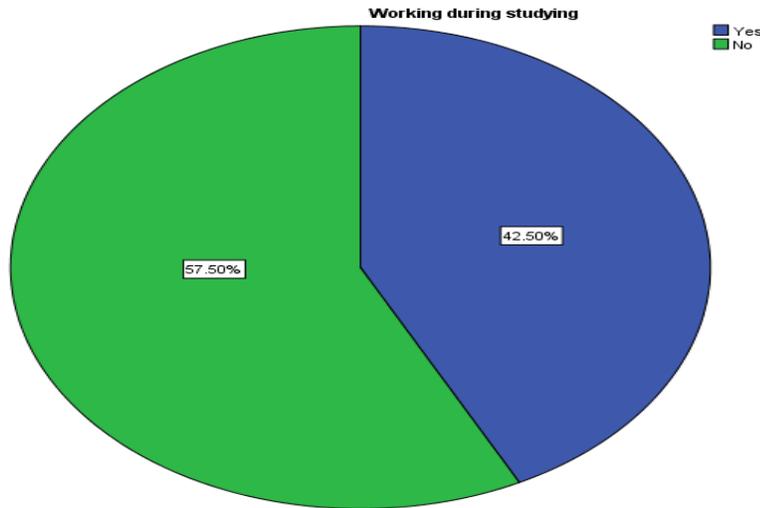


Figure 2: The working status of the participating students

Then, the students were further randomly allocated into two groups. Group A students were admitted to TEL lectures with audiovisual aids while group B students were admitted to the same topics but using the regular lecturing tools. Group A included 60 students; 26 (43.4%) of them were living in rural districts and 34 (56.7%) were living in urban ones. Twenty (33.3%) students stated that they were working in nursing related jobs during studying. On the other hand, group B included the same number, 60 students; 17 (28.3%) had urban residence and 43 (71.7%) had rural residence and 31 (51.7%) students had in nursing related jobs.

Table 1: Effect of TEL lectures on knowledge, attitude and practice of students regarding the different stages of labor.

Aspects of Study		TEL Lectures		
		Before (mean±SD)	After (mean±SD)	P value
Attitude (Score = 9)		3.15 ± 0.40	6.20 ± 1.05	<0.001*
Knowledge (Score = 80)		32.32 ± 18.13	67.23 ± 12.59	<0.001*
Practices	First Stage of Labor (Score = 22)	12.57 ± 3.72	18.47 ± 4.44	<0.001*
	Second Stage of Labor (Score = 48)	24.17 ± 7.36	39.90 ± 6.93	<0.001*
	Third Stage of Labor (Score = 22)	11.95 ± 4.19	16.90 ± 4.51	<0.001*

Table 1 show that the scores of attitude of students towards the different stages of labor improved significantly from 3.15 ± 0.40 before TEL lecturing to 6.20 ± 1.05 after the end of the course (P value < 0.001). A similar statistically significant rise was noticed in students' knowledge from 32.32 ± 18.13 before the TEL course to 67.23 ± 12.59 after the end of the ET lectures (P value < 0.001). Regarding practice scores according to the designed checklist, the practice scores of the three stages of labor rose markedly from 12.57 ± 3.72 , 24.17 ± 7.36 and 11.95 ± 4.19 before the TEL lectures to 18.47 ± 4.44 , 39.90 ± 6.93 and 16.90 ± 4.51 after the end of the TEL lectures, respectively (P value < 0.001).

Table 2: Effect of Regular lectures on knowledge, attitude and practice of students regarding the different stages of labor.

Aspects of Study		Regular Lectures		
		Before (mean±SD)	After (mean±SD)	P value
Attitude (Score = 9)		3.15 ± 0.40	3.58 ± 0.89	<0.001*
Knowledge (Score = 80)		25.46 ± 14.43	39.90 ± 18.43	<0.001*
Practices	First Stage of Labor (Score = 22)	9.03 ± 3.62	14.46 ± 3.48	<0.001*
	Second Stage of Labor (Score = 48)	18.38 ± 4.97	26.73 ± 8.47	<0.001*
	Third Stage of Labor (Score = 22)	9.08 ± 2.72	13.51 ± 3.36	<0.001*

Table 2 shows that the attitude scores of students, admitted to regular traditional lectures, towards the different stages of labor rose from 3.15 ± 0.40 before lecturing to 3.58 ± 0.89 after the end of the course (P value < 0.001). Similarly, a statistically significant rise was noticed in students' knowledge from 25.46 ± 14.43 before the course to 39.90 ± 18.43 after the course (P value < 0.001). Regarding practice scores according to the designed checklist, the practice scores of the three stages of labor rose markedly from 9.03 ± 3.62 , 18.38 ± 4.97 and 9.08 ± 2.72 before the lectures to 14.46 ± 3.48 , 26.73 ± 8.47 and 13.51 ± 3.36 after the lectures, respectively (P value < 0.001).

Table 3: Comparison between the effect of both types of lectures on knowledge, attitude and practice of students regarding the different stages of labor.

Aspects of Study		Lectures		
		TEL (mean±SD)	Regular (mean±SD)	P value
Attitude (Score = 9)		6.20 ± 1.05	3.58 ± 0.89	<0.001*
Knowledge (Score = 80)		67.23 ± 12.59	39.90 ± 18.43	<0.001*
Practices	First Stage of Labor (Score = 22)	18.47 ± 4.44	14.46 ± 3.48	<0.001*
	Second Stage of Labor (Score = 48)	39.90 ± 6.93	26.73 ± 8.47	<0.001*
	Third Stage of Labor (Score = 22)	16.90 ± 4.51	13.51 ± 3.36	<0.001*

Table 3 compares between the evaluated scores between TEL lectures and regular lectures after the end of both courses regarding attitude, knowledge and practice of students. As shown, the figures for all aspects of TEL were markedly higher than that of regular lectures. In details, the post- course attitude score of TEL students was 6.20 ± 1.05 and regular lectures score was only 3.58 ± 0.89 (P value < 0.001). Alike, knowledge score in TEL group was much higher than their counterparts in regular lecturing group 67.23 ± 12.59 vs. 39.90 ± 18.43 (P value < 0.001). Regarding practice scores, the TEL figures stood at 18.47 ± 4.44 , 39.90 ± 6.93 and 16.90 ± 4.51 ; significantly higher than regular lectures 14.46 ± 3.48 , 26.73 ± 8.47 and 13.51 ± 3.36 , respectively (P value < 0.001).

Discussion

Technology-enhanced learning focuses on how technologies can add value to learning and teaching processes. Today's learners have access to increasingly powerful and affordable handheld computing devices, including smart phones, games consoles and tablet computers. They can share, interact and immerse themselves online with others through the use of social networks and virtual worlds. They can also create identities and user-generated resources that potentially have a virtual worldwide audience enabled by the Internet. Learners' activities can be captured in real time and feedback processes automated with increasing precision through learning analytics. Technologies that allow users to post material and messages online have the potential to support learner inquiry, to offer new modes of

representation and expression requiring new forms of literacy, to support innovative thinking and problem solving through collaboration, and to allow publication of work.⁸⁻⁹

However, development and implementation of new approaches to teaching and learning must be trialed and tested so that widespread adoption of TEL innovation is based on evidence and not on theory alone. This evidence could come from comparative trials in classrooms or in training environments, judging success by improvement in test scores.

In comparison to the stereotypical regular ways of teaching, TEL courses achieved much higher rates of success. In our study, students who were admitted to the specially designed TEL lecturing program showed significant improvements in attitude, knowledge and practice scores regarding the all stages of labor (P value < 0.001). Moreover, the scores of the same aspects; knowledge, attitude and practice of those who were admitted to TEL lecturing program were significantly higher than those who were admitted to regular lectures given by the same lecturers (P value < 0.001).

In consistence with our findings, the final report of the European Commission's Open Consultation Process on 'New Research Challenges for Technology Supported Learning' clearly expressed the success of TEL lecturing in different higher education studies.¹⁰ The report offered a response to the confusing nature of intellectual, disciplinary and research community topics where TEL can serve.^{1,10} Alike , a diversity of TEL research effort had resulted from the different cultures, traditions and trajectories associated with the various national educational systems, and their highly differentiated experience of and ambitions for using technology in support of learning and it was surprising that TEL lecturing achieved success whatever the culture and the background of the learners .¹¹

Furthermore, in 2005, the Department for Education and Skills report on harnessing technology included references to lifelong learning electronic programs and occupational training which achieved remarkable success in interactive learning , especially for younger students.¹² In the same decade, the 'Strategy for e-learning' and its successor 'Enhancing learning and teaching through the use of technology' published by the Higher Education Council for England (HEFCE) focused on the higher education sector and showed remarkable rises in evaluation grid scores for most of the studies performed using TEL programs compared to regular teaching.¹³

However, unlike our findings which showed a marked improvement in the aspects of knowledge, attitude and practice of students promptly after the end of the TEL courses, the report stated that the improvements were very gradual and took few years to be noticed.¹³

Another point to be considered, throughout our search for similar studies, we noticed that most TEL studies, including ours, were on a limited scale and always included small samples.

Conclusion

Based on study findings, it can be concluded that: Looking to the various approaches of nursing teaching from the ethical point of view, the concept of "learning by doing" has become less acceptable, particularly when invasive procedures and high-risk care are required, such as in our case which is concerned with the successive grades of labor care. Restrictions on nursing educators have prompted them to seek alternative methods to teach nursing knowledge and gain procedural experience. Fortunately, the last decade has seen an explosion of the number of tools available to enhance nursing education: web-based education, virtual reality, and high fidelity patient simulation such as TEL programs.¹⁴

Recommendations

Based on the present study findings:

1. We highly recommend the new policies which expand in TEL programs researches and applications which will lead to a better training , participation and involving of the students into the academic course and guarantee an inter disciplinary, interactive, comprehensive and facilitative nursing teaching. TEL lectures were proved to offer learners control over content, learning sequence, pace of learning, time, and often media, allowing them to tailor their experiences to meet their personal learning objectives.
2. Future innovations in TEL point toward a revolution in education, allowing learning to be individualized (adaptive learning), enhancing learners' interactions with others (collaborative learning), and transforming the role of the teacher.

3. The integration of TEL programs into nursing education can catalyze the shift toward applying adult learning theory, where educators will no longer serve mainly as the distributors of content, but will become more involved as facilitators of learning and assessors of competency.
4. Such programs need a developing infrastructure to support TEL within nursing education including digital libraries, to manage access to e-learning materials, consensus on technical standardization, training of staff for usage of highly sophisticated teaching programs and methods for peer review of these resources in addition for sure to financial support.

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