Impact of the use of a digital learning object in the teaching of clinical assessment of preterm infants: a comparative study

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Abstract

This study aimed to assess the cognitive learning of undergraduate nursing students on the clinical assessment of the preterm infants aided by the use of a digital learning object (DLO) linked to the Internet compared to the traditional classroom method. Material and methods: the experimental study was carried out with groups of nursing students from a Brazilian public university, separated into control and experimental groups, in which the first participated in classes taught in a traditional way and the latter had access to the DLO. Data analysis was based on the results of statistical tests of pre and post-tests. Results and discussion: there was no statistically significant difference between groups (p>0.05), however, it was documented, based on subjective assessment, a high level of satisfaction with the use of the educational technology and interest in the dissemination of the strategy to other themes and moments of the course.

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1. Introduction

Significant learning grounded in active learning methods is recognized by Brazilian policy as a strategy in training professionals who can get closer to the reality of practice while still in undergraduate studies, increasing the autonomy of the student (BRASIL, 2004).

Thinking of tools that help students in this process of autonomy and active participation in education, some educational technologies, such as the DLO have been developed in nursing.
DLO is a digital resource with multimedia support and hypermedia language that can be reused and has means for interactive learning through animations or simulations (GALLO; PINTO, 2010).

Researchers have developed the DLO Semiotechnique and semiology of the preterm infant (FONSECA et al., 2009) which presents advanced, computerized and interactive technology with simulations that allow the approximation to reality, presenting, gradually, the complexity and the specificities of premature infants. It was considered appropriate as to content and functionality in its assessment by experts and students. Instigated with the impact of the use of the DLO in the teaching of the subject, this study aimed to evaluate the cognitive learning of undergraduate nursing students on clinical examination of preterm infants assisted by the DLO compared to regularly given classes and subjectively evaluate the DLO from the perspective of students.

2. Material and methods

This is a randomized experimental study using pre and post-test, with control and experimental group (SOUZA, 2009). Inclusion criteria were: students enrolled in the child health course of a nursing program in a Brazilian Public University in the interior of the state of São Paulo, Brazil. Of the total of subjects, 32 students, none refused to participate, but 10 students did not go classes in the day to accomplish the pre or post-test and one student lost the results of the pre-test due to problems with the computer. Thus, the study had the participation of 21 undergraduate students, among which 10 were part of the control and 11 experimental group. The participation of students in the groups was defined randomly.

The DLO "Semiotechnique and semiology of the preterm infant" (SSRNPT) which was available for access of the experimental group at the institutional webmail, presents multimedia material on the clinical evaluation of the premature infant and interaction with the environment, family and staff, consisting of videos, images, sounds, texts, questions and educational schemes. A major advantage of the DLO SSRNPT, from the pedagogical point of view, is the freedom that users have to navigate through the tool and to study what is wanted and considered important, without the need to complete modules to move forward.

The data collection instruments were: characterization of the subjects, pre and post-test (online questionnaire with 20 multiple-choice questions containing multimedia - photos, videos, sounds and figures on topics of the DLO); subjective evaluation questionnaire of the student on the DLO in Likert-type scale (for students from the experimental group).

The pre-test, along with the characterization of the subjects, was performed in the computer room of the university, before students had any contact with the child health course.

The intervention was performed in separate groups, the control group had classes conventionally given for the course and the experimental group had contact with the DLO in the presence of the facilitator during the same period of 4 hours of class as the control group.

After the intervention, the post-test was carried out in the computer room of the institution, with all participants and the same online instrument used in the pre-test. It is important to report that the time interval between tests was approximately two months, during which time the child health course was offered in the nursing program at the participant university.

In the statistical comparison between the experimental and control groups as to difference in student performance, an independent variable was identified, since the average performance of individuals in one group does not interfere in the other group. Therefore non-parametric Mann-Whitney analysis was used, with confidence interval of 95%, thus considered a significant difference with p value less than 0.05%. Students were assessed comparing their performances before and after the course by non-parametric Wilcoxon analysis, considering α=0.05.

This study was approved by the Research Ethics Committee of the University of São Paulo at Ribeirão Preto College of Nursing under n.0974/2008. The researcher is not teaching at the university participating in the study, therefore there is no relationship of faculty-student dependence.
3. Results and discussion

Of the 21 students participating in the study, 90% (n=19) were women and aged between 18 and 25 years. In the sample, one student in the control group and one in experimental group were male and over 26 years. Young sample was also found in other studies with nursing students, but this study had a higher percentage of female students compared with Peres, Meira and Leite (2007) and Alvarez and Dal Sasso (2011).

Most students affirmed that they use the computer often (95% / n=20), since all participants in the experimental group reported frequent use and only one student in the control group answered using the computer regularly.

Regarding the weekly average time that the student spends on the Internet, students in the experimental group reported 20 hours per week, slightly less than the control group (22 hours per week). In the experimental group, 63.63% of the participants reported using the Internet both at university and at home (n=7) while 36.33% reported accessing at home (n=4). In the control group, 10% of the students reported accessing at the university, 40% at home and 50% both at home and at the university. All students affirmed having already used the Internet to support the activities of the university program, including for studying the theme of preterm infants or clinical evaluation (except for four students, of whom two from the experimental group and two in the control group).

In the comparative analysis of the experimental and control groups, non-parametric tests were performed with the Statistical Package for the Social Sciences (SPSS) due to the constrained size of the sample, thus considering the performance obtained between pre and post-tests of students from the two groups.

Table 1 presents the average, median and standard deviation of correct answers obtained by the groups.

| Test        | Average | Median | Standard deviation |
|-------------|---------|--------|--------------------|
|             | Pre     | Post   | Pre    | Post   | Pre   | Post   |
| Control     | 54,8    | 56,9   | 55     | 60     | 12,92 | 10,72  |
| Experimental| 58,18   | 66,63  | 55     | 70     | 18,88 | 13,97  |

The grades at the experimental group are better, but there is no variance with the control group. In follow, the graph shows the statistically non-significant comparison demonstrated by p value = 0.225.
An intra-group assessment also considered student’s performance before and after the course, and the dependent variable was identified, that is, the individual is considered its self-control. To meet the nonparametric requirements of this analysis, the Wilcoxon test was used and showed a non-significant improvement neither in control group (p=0.527) nor in experimental group (p=0.102), considering α=0.05.

It is important to analyze through these data that although there were no statistically significant improvement for both groups, there was learning in neonatal health theme expressed by others that not only this performance measured objectively, as development of activities at the hospital with patients and health staff, discussions and class participation and many others considered to assess students’ skills. Based on results, the experimental p value is closer to reach statistical significance, suggesting the trend of better performance by the group that received educational intervention through technology, what need to be tested with larger samples.

In addition to the cognitive assessment, which is a key factor in the study of the impact and effectiveness of the use of DLO in nursing education, it is emphasized the importance and need for subjective evaluation that considers the impressions and reflections that students express about the tool. Thus, on the day scheduled for the completion of post-test, the experimental group completed a subjective assessment instrument of DLO. Of the 11 students, one had to leave right after the post-test, and did not answer to the instrument, totaling 10 participants in the subjective evaluation of the DLO.

It was verified that most participants agreed that the DLO has improved their teaching-learning process and disapprove that educational technologies can replace the professor, according to table 2.

| Characteristics of a digital object | Strongly Agree | Agree | NA/ND* | Disagree | Strongly Disagree |
|------------------------------------|----------------|-------|---------|----------|------------------|
| Easy to use                        | 30%            | 60%   | 10%     | 0        | 0                |
| Agreeable                          | 10%            | 70%   | 20%     | 0        | 0                |
Many of the participants (60%) did not agree or disagree that they have felt motivated to use the DLO. Regarding motivation, two statements are needed, the first concerns the characteristic of the course, which at the participating institution there was choice not to go to clinical practice scenarios at neonatal units, thus students in the study may not have had the need to study using the digital object contents that they would not have in practical activities, as they only have developed activities in pediatric units, not providing care, during this discipline, to premature infants. And second, the digital object provides 25 hours of navigation, which is a lot of content to a discipline with total workload of 150 hours for theoretical and practical activities at the hospital. It is helped by the fact that it provided multimedia resources (photos, videos, sounds, pictures and animations) and is flexible, however, the digital object could have been grounded by the emotional aspects of the emotional design in human-computer interaction, implementing the interface with a multimedia system for Web with a level of full interactivity through simulation scenarios built on characters with two-dimensional (2D) animation; which is a phase to be developed in further studies.

Researchers cared with this aspect as well as Blake (2010) concluded in the work that there was a lack of motivation from the students to take advantage of the digital material, as it was not a compulsory use in the course. The author adds the need for digital objects being visually stimulating and interactive.

In the instrument of subjective evaluation, there was space reserved for the student to put their perceptions, suggestions and criticisms. Among the statements, a student stated that "to acquire facility in using the digital object there is needed to access it a few times, its facility is not immediate. I felt encouraged to use it, as its information is (J.M.). Cogo et al. (2010) pointed out the lack of skill in the use of digital communication elements by nursing students and low interaction between them.

Other students pointed out the importance of technology as an aid in the learning process, "(...) I found the site very interesting and very complete and instructive. I think it can be a great ally in learning" (NCSC); "(...) but I think it should be complementary to the role of the professor and not replace it" (J.M.).

Currently, at the digital age, University students, part of a new generation, are called by some as "digital natives" and have very different learning needs than past generations expressed until today in education environments. Some experts argue that today's youth learn best when learning is related to technology and the Millennium generation lean positively to the achievement of group tasks, based on experiences and problems and collaborative and interactive learning (GIBSON, 2009; BERRY, 2009).

The DLO should be considered as a supplement in education, reinforcing the idea of a tool that adds, and does not exonerate the role of the educator (LEONARDI-BEE, 2007). It is highlighted that besides composing education as an auxiliary tool, educational technologies should play a role in stimulating the study and constant search for new knowledge.

One student suggested to "make more videos for exercises or knowledge..." (FHF). In exercise of the DLO there are everyday situations and users generate hypotheses and choose alternatives that they find most appropriate to the problems presented and have feedback from the learning (FONSECA et al., 2009).

In the DLO used there are some exercises with the use of video, however, other multimedia material could be implemented, as suggested by another student about the videos that "(...) it would be very interesting if the videos had speech" (M.O.).
In educational technologies, the integration of animation with sound (audio and visual media) is more effective than animation with text (visual media only), as different media together increase the understanding of the content (LOPES; ARAUJO, 2004).

Although limitations must be considered, such as the small sample size and lack of control of users' access, it is believed that the study contributed to the clarification of the use of technology in undergraduate nursing teaching and demonstrated the importance of evaluation of virtual objects developed and validated with the public for whom the creation was proposed.

4. Final Considerations

It is believed that the use of digital learning objects, when in line with the pedagogical context of the program, included in the typical practices of the course and used as an auxiliary tool in active learning methods, presents a positive impact in the educational process in nursing.

It is recommended that studies are designed to assess the impact of the use of educational technologies inserted in virtual learning environments, which could help, among others, the interaction among students and among them and professors.

References

Alvarez, A.G., Dal Sasso, G.T.M. (2011). Aplicação de objeto virtual de aprendizagem, para avaliação simulada de dor aguda, em estudantes de enfermagem. Revista Latino-Americana, 19, 2, 229-37.

Berry, J. (2009). Technology support in nursing education: clickers in the classroom. Nursing Education Perspectives, 30, 5, 295-8.

Blake, H. (2010). Computer-based learning objects in healthcare: the student experience. International Journal of Nursing Education Scholarship, 7, 1, 1-15.

Brasil, Ministério da Saúde. (2004). Portaria N° 198/GM/MS. Institui a Política Nacional de Educação Permanente em Saúde como estratégia do Sistema Único de Saúde para a formação e o desenvolvimento de trabalhadores para o setor saúde. Brasília: Ministério da Saúde.

Cogo, A.L.P., Silveira, D.T., Pedro, E.N.R., Tanaka, R.Y., Catalan, V.M. (2010). Aprendizagem de sinais vitais utilizando objetos educacionais digitais: opinião de estudantes de enfermagem. Revista Gaúcha de Enfermagem, 31, 3, 435-41.

Fonseca, L. M. M., Góes, F. S. N., Ferecini, G. M., Leite, A. M., Mello, D. F., Scochi, C. G. S. (2009). Inovação tecnológica no ensino da semiótica e semiologia em enfermagem neonatal: do desenvolvimento à utilização de um software educacional. Texto & Contexto Enfermagem, 18, 549-58.

Gallo, P., Pinto, M.G. (2010). Professor, esse é o objeto digital de aprendizagem. Revista Tecnologias na Educação, 2, 1.

Gibson, S. (2009). Enhancing intergenerational communication in the classroom: Recommendations for successful teacher-student relationships. Nursing Education Perspectives, 30, 37-9.

Leonardi-Beej, J. (2007). Development and evaluation of a re-usable learning tool to supplement didactic lectures. Disponível em: http://www.nottingham.ac.uk/pszl/resources/elearning/developm498/

Lopes, M.V.O., Araujo, T.L. (2004). Avaliação de alunos e professores acerca do software “Sinais Vitais”. Revista Escola de Enfermagem USP, 38, 438-47.

Peres, H.H.C., Meira, K.C., Leite, M.M.J. (2007). Ensino de didática em enfermagem mediado pelo computador: avaliação discente. Revista Escola de Enfermagem USP, 41, 2, 271-8.

Souza, R.F. (2009). O que é um estudo clínico randomizado? Medicina, 42, 1, 3-8.