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Persuasive Technology in Nursing Education About Pain

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Abstract. Mobile devices, as persuasive technologies, represent an important platform to promote changes in attitudes and behaviors. They are not only understood as tools, but as a learning process that provides different opportunities to learn how to learn. The objectives of the study were to measure the quality of a virtual mobile learning object, to measure the mental workload of the educational intervention, and to evaluate the learning results. This is a technological production study with a mixed method, quasi-experimental approach. Three simulated clinical scenarios comprise the m-OVADor[@], allowing for a simulated evaluation of acute pain through interactive tools. The technology met the quality criteria for educational software, with low mental workload, demonstrating a significant strategy for learning about pain among nursing students.

Keywords. persuasive technology, mobile learning, nursing education, nursing informatics, pain

1. Introduction

Pain is considered a public health problem worldwide, and gaps in professional learning contribute to this situation [1]. Therefore, development of innovative strategies for teaching and learning about pain is necessary, in order to promote improvements in patient care. In this context, the popularity of mobile devices is able to expand learning opportunities in a flexible, innovative and dynamic way [2].

As persuasive technologies, mobile devices are an important platform to promote changes in attitudes and behaviors. They are not only understood as tools, but as a learning process that provides different opportunities to learn how to learn, in a flexible and interactive way [3-4].

The inclusion of educational technologies has the potential to promote a link between theory and practice, encouraging students to make different connections between previous concepts and new knowledge, thereby facilitating reflection on their practices [5].

Therefore, based on the development of a Virtual Learning Object (VLO) for learning the nursing assessment of acute pain, the aim of the study was to evaluate the

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quality of the technology with the Learning Object Review Instrument - version 2.0 (LORI 2.0) [6]; to measure the mental workload of the educational intervention using the NASA Task Load Index Index (NASA TLX) [7]; and, to evaluate the learning results of undergraduate nursing students.

2. Methods

This is a technological production study with a mixed method, quasi-experimental approach, approved by the Research Ethics Committee of the Federal University of Santa Catarina (UFSC) - certificate number 2456/2012.

The study was performed from Nov/2013 to Feb/2014, with the participation of 75 undergraduate nursing students and five nurse experts. All received instructions on participation by e-mail and in a closed group on the social network, Facebook®.

m-OVADor® was based on the concept of the VLO [8]. The technology was accessed by means of the participants' own mobile devices, and the content was made available in three languages (Portuguese, English, Spanish), comprising three simulated clinical scenarios (adult surgery clinic, adult intensive care, and pediatrics) (Figure 1).

Its structure enables the simulated assessment of acute pain using interactive tools that address the different variables involved in pain assessment (talking with the patient, applying pain scales, assessing behavioral and physiological aspects of acute pain, determining nursing diagnoses and interventions) (Figure 2). All student actions are recorded in the system, and can be found in patient charts.

Figure 1 – Clinical scenarios of m-OVADor®

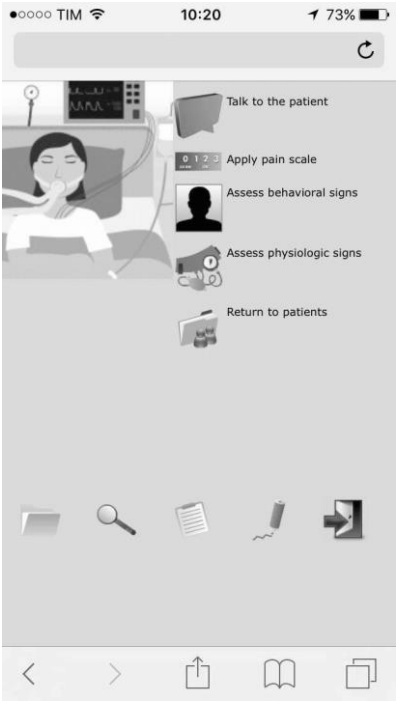

Figure 2 – Interactive tools for pain assessment.

The evaluation of the quality of the technology was based on the variables of LORI 2.0 (Content quality, Learning goal alignment, Feedback and Adaptation, Motivation, Presentation design, Interaction usability, Accessibility, Reusability and Standards compliance) [6], using a 5-point Likert scale (5-Excellent to 1-Bad), with the target mean being 3-Good.

The mental workload between students and experts was measured with the NASA TLX, which assesses the following dimensions: Mental demand, Physical demand, Temporal demand, Performance, Effort and Frustration level [7]. The mental workload index was established by multiplying the rate attributed to each dimension by the weight assigned to each dimension, followed by the sum of these values, the total value divided by 15. The results were analyzed based on a scale of 0 to 100 points.

Data were analyzed using the SPSS software, version 21.0, considering a level of significance of $p<0.05$ for a 95% confidence interval.

3. Results

The evaluation of the quality, according to students and specialists, averaged 4.27 and 4.31 respectively, on a 5-point Likert scale. Among the students, the variables "Standards compliance" (4.47) and "Presentation design" (4.55) stood out with the highest evaluation, whereas among the experts the following variables stood out "Content quality" (4.80) and "Reusability" (4.80).

The mental workload index was higher in experts than in students (50.20 vs. 47.87). The dimension "Mental demand", defined as the amount of mental and perceptual activity that the educational intervention demands, stood out as a major contributing factor to mental workload in experts and students (57.20±22.27 vs. 51.00±29.45).

Also, experts and students recognized high levels of "Performance" (73.00±28.80 vs. 58.47±24.19), defined as the point where the level of satisfaction with their own income during activity (Figure 3).

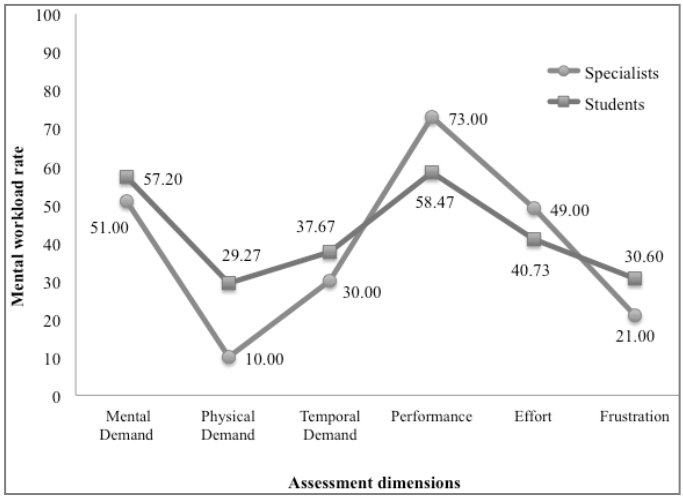

Figure 3. Mean rates of students (n=75) and experts (n=5) for the dimensions of NASA TLX.

The dimension "Physical demand" (29.2±27.91 vs. 10.00±8.66), defined as the amount of physical activity that online educational intervention demands from the subject, was indicated by students and experts as the dimension of lowest contribution to mental workload.

The learning evaluation in students showed significantly higher results ($p<.001$) in the post-test (7.51) compared to the pre-test (5.23).

In further evaluation, students gave their opinions about the online mobile device-based learning experience. The content analysis [9] showed that students recognize the subject's contribution to learning and its relevance; that technology motivated them to learn how to learn; the recognition of gaps in pain assessment in their nursing education; and the need to introduce VLOs in higher education. The possibility of mobility and ubiquity, the degree of interactivity and the layout also stood out.

4. Discussion

The evaluation of technology quality exceeded the target mean (3-Good) in students and experts (4.27 vs. 4.31), considering a 5-point Likert scale. The results indicate the suitability of the technology produced for online educational interventions. The highlight attributed by students for the variable, "Standards compliance", (4.47±0.88) represents the recognition of the appropriateness of the technology from a technical point of view, whereas the variable, "Presentation Design", (4.55±0.74) demonstrates the suitability of the VLO regarding its layout, an element that influences user satisfaction [10].

For the experts, the variables of "Content quality" (4.80±0.45) and "Reusability" (4.80±0.45) stood out in the evaluation, which can be related to a pedagogical vision of the VLO, as well as the recognition of the possibility of its use in different learning contexts.

The results from NASA TLX indicated that the educational intervention demanded a greater "Mental demand" to complete the proposed activity (think, decide, remember, look, research), probably related to the need for greater attention to the different types of information available in m-OVADor® and the need to answer questions throughout the simulation.

Noteworthy are the low levels of mental workload, positively contributing to the mobile device-based approach for learning, as a viable process for use in the teaching-learning process in nursing, which is comparable to results of other studies [11-14].

The low "Physical demand" required for the activity can be justified by the familiarity of participants with mobile devices, as well as in other studies [11,15]. Also, the learning results of this group of students were significant ($p<.001$), confirming the potential for the introduction of technology in higher education.

5. Conclusion

The technology is considered to be appropriate quality for use in online educational interventions, low mental workload, satisfaction among students regarding mobile-device based approach for learning, and it also promoted meaningful learning.

Access through persuasive technologies can collaborate to fill the gap in new strategies for teaching of pain assessment among nursing professionals, establishing a new way of learning how to learn.

As future challenges, we highlight the need to develop new VLOs, planning strategies for inclusion of these technologies in higher nursing education, and training of faculty for its use. Thus, we conclude that m-OVADor® stimulated students' learning by means of a flexible, interactive and innovative process.

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Endnote

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