Evolution of students' self-confidence and trust after learning in periodontics manikins

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ABSTRACT

Simulation in health education is a tool that allows the student to learn in a protected and controlled environment, free from intercurrences and with instant feedback of the task performed. Simulation assists the instructor to evaluate the procedure performed and allows them to intervene at any moment, warning or instructing the student. This study aimed to evaluate the evolution of students' self-confidence and trust after simulated learning in a manikin during a curricular component of Periodontics and its correlation with practical performance. Questionnaires using visual analog scale (VAS), 101-point numeric rating scale (NRS-101) and 4-point verbal rating scale (VRS-4) were applied to students enrolled in Periodontics I course at the Federal University of Paraná, Curitiba, Brazil, in the first term of 2018, in three different moments: 1) before the beginning of the practical activities; 2) after the laboratory phase; and 3) after the clinical phase. The data from the questionnaires were correlated with the final practical performance. Students reported being more self-confident and secure at the end than the beginning of the term (Friedman; p<0.05). This evolution was noted mainly between the first and second questionnaire applications, after the laboratory phase with simulation. There was a correlation between self-confidence and trust measured in NRS-101 and the practical performance (Spearman; r=0.3948 and r=0.3771, respectively; p<0.05). Students' self-confidence and trust increased after simulated learning, which was slightly more valuable for the evolution of these aspects in comparison to the clinical experience.
Descriptors: Educational Measurement. Trust. Manikins. Periodontics. Laboratories, Dental.

1 INTRODUCTION

Simulation-Based Learning (SBL) in the Medical area avoids intentional risks to the patient and allows the student to recognize

possible knowledge flaws during the learning process. Besides, it allows greater dedication to the simulated technique so the student can develop better interpersonal relationships when evaluating patients[1].

The use of simple manikins (dolls) was introduced in the 1960s aiming to improve learning as a simulation tool to the theoretical and practical aspects of Medicine[2]. Simulation is an active and rational method for training basic skills which uses task-based learning in a protected, safe and controlled environment that reproduces actual scenarios. Such method allows repeated execution of a task with immediate, adequate and systematic feedback. An array of objects and representations composes this learning system, such as inert manikins, anatomic models, virtual reality, actors or simulation of a complete environment[3].

Some students may feel insufficiently prepared for their first clinical performance. A study has shown that this feeling is not necessarily related to the student's true ability but rather to their confidence[4]. Increases in self-confidence and greater connection to the environment have been reported following simulated learning[4]. Besides, patients have described students with previous simulation-based learning experience as calmer and more confident[5]. Despite all those advantages, SBL frequently challenges faculty members who are in contact with students with different theoretical and practical levels and need to adequate for a better experience with simulated practice[3]. Additionally, interviewed faculty members reported that some students had low interest in the activity due to interpreting the tool only as a "doll" and facing the activity with little seriousness[3]. Specifically for the Dental community, a limitation observed in the literature was the lack of details of manikins when reproducing the oral mucosa[5].

The objective of this study was to evaluate the evolution of self-confidence and trust in SBL students enrolled in the Periodontics I course offered by the Dental School of the Federal University of Paraná, in Curitiba, Brazil through a complete term.

2 METHODS

The study was approved by the Institutional Ethics Review Board. Invitation and all steps of interaction with students, like obtaining the Informed Consent and applying the questionnaires, were conducted by the associate researchers without the presence of the principal investigator (JPS), who also teaches that Course. That was performed to preserve a healthy teacher-student relationship and avoid vulnerability, diminished autonomy or embarrassing situations. Similarly, all material collected by the researchers was codified, preventing any retaliation risk to nonparticipant students or embarrassments related to individual autonomy.

Periodontics I course was selected due to its theoretical-practical characteristic, with weekly frequency and an organized teaching environment, being the first moment when Dental students have contact with this area. The first three classes are lecture-based, followed by six practical classes for training Scaling and Root Planing (SRP) in manikins, and the last four classes are clinical practice with patients.

For this prospective longitudinal observational study, all thirty-seven students enrolled in Periodontics I course at the Dental School of the Federal University of Paraná in the first term of 2018, from both genders and any age – therefore, convenient sample - were invited to participate. After signing the Informed Consent, a questionnaire was applied to students in three moments throughout the term: 1) at the beginning of the term, before practical activities were

initiated; 2) two months later, after SBL phase; and 3) three months after the first application, after the clinical phase. Self-confidence and trust of students in performing clinical periodontal procedures and SRP, as well as instruments selection and hygiene instructions, were assessed.

The questionnaire was elaborated by the authors to answer the central research question (self-confidence and trust) and was composed of eight questions. Self-confidence was defined as confidence in one's self, i.e., credibility or positive concept that one has regarding someone or something; credit; security; belief that something is of high quality and shall not fail. Trust was defined as a condition characterized by the feeling of peace and tranquility, free of risks; strength or firmness in the movements[6]. Such definitions were considered separately, since the first one has a self-evaluation subjective aspect and the second one represents the evaluation that the individual makes regarding their own actions during clinical and lab procedures. All questions are presented in table 1.

Table1. Questionnaire used for evaluating self-confidence and trust

• What is your self-confidence level to perform clinical procedures in Periodontics?
• What is your self-confidence level to perform Scaling and Root Planing (SRP)?
• What is your self-confidence level to select instruments for SRP?
• What is your self-confidence level to instruct oral hygiene to a patient?
• What is your trust level to perform clinical procedures in Periodontics?
• What is your trust level to perform Scaling and Root Planing (SRP)?
• What is your trust level to select instruments for SRP?
• What is your trust level to instruct oral hygiene to a patient?

Each question was answered by the respondent using a Visual Analogue Scale (VAS), which consists of a 10-cm line anchored by two extremes nominated "none" and "as high as possible". The respondent is asked to draw a mark at the line in the position that represents the level of what is being studied. The line is then measured from the "none" extremity to the drawn mark; 101-point numerical rate scale (NRS-101), which the respondent answeres the question writing a number from 0 to 100, being 0 the lowest level and 100 the highest; and a 4-point verbal rate scale (VRS-4), represented by a list of 4 adjectives that describe different levels: 0) none, 1) low, 2) moderate, 3) high.

The duration of questionnaire application was approximately 5 minutes and were performed in the Periodontics lab room, after practical classes. The different scales used aimed to obtain different types of variables (discrete numerical, continuous numerical or categorical).

The scores for practical activities evaluation were achieved by consensus among faculty members, using criteria representative of students' involvement throughout the term. In each practical class (weekly), each student was evaluated using an individual card report containing items such as "punctuality", "material", "involvement" and "others". All faculty members were blinded to the results of

this study at the time of score assignment.

For quantitative data, normal distribution was evaluated using Kolmogorov-Smirnov test. Due to nonnormal distribution, Friedman nonparametric test followed by Dunn post-hoc test were used for comparisons between initial, after lab phase and after clinical phase questionnaire applications. The same tests were used for the categorical variable VRS-4. For self-confidence and trust assessment, data were tabulated grouping answers to questions 1-4 and 5-8, respectively. Such parameters were then correlated with the students' practical scores using Spearman correlation test. All tests were performed using Prism 7 software (GraphPad Software, La Jolla, California, US) and significance level was set at 5%.

3 RESULTS

Thirty-five individuals composed the sample at the end of the study. Two students were excluded due to absence in at least one out of the three sessions of questionnaire application.

When students answered using VAS, time 2 was significantly different from time 1 for questions 1 to 7 (p<0.0001). There was also a statistically significant difference between times 1 and 3 for all questions (p<0.0001) and between times 2 and 3 for questions 1, 3 and 5 (p<0,0001) (table 2).

Table 2. Mean±SD/median (Δ to previous Moment) of answers using Visual Analogue Scale (VAS) for each question (Q) at the beginning of the course (1st Moment), after lab practice (2nd Moment) and after the clinical practice (3rd Moment)

	1st Moment	2nd Moment	3rd Moment	p
Q1	$30.26\pm20.22/27.9_A$	$48.86\pm15.6/48.9 (18.6)_B$	$66.73\pm17.0/69.4 (17.8)_C$	<0.0001
Q2	$23.49\pm22.35/17.2_A$	$50.79\pm16.5/48.9 (27.3)_B$	$55.99\pm22.34/57.3 (5.2)_B$	<0.0001
Q3	$18.47\pm17.07/12.6_A$	$64.99\pm22.35/67 (46.52)_B$	$83.73\pm14.61/87.8 (18.7)_C$	<0.0001
Q4	$70.68\pm16.23/68.8_A$	$82.43\pm12.31/85.1 (11.7)_B$	$87.29\pm12.62/89.4 (5.3)_B$	<0.0001
Q5	$24.25\pm20.42/27.9_A$	$50.61\pm18.09/48.9 (26.3)_B$	$68.99\pm17.86/69.6 (18.3)_C$	<0.0001
Q6	$20.65\pm19.06/15.9_A$	$52.05\pm19.96/54.4 (31.4)_B$	$62.7\pm24.15/68.4 (10.6)_B$	<0.0001
Q7	$17.46\pm15.63/13.8_A$	$67.15\pm22.43/74.4 (49.6)_B$	$83.65\pm14.77/88.4 (16.5)_B$	<0.0001
Q8	$68.19\pm21.81/70.9_A$	$81.76\pm14.5/87.2 (13.5)_{AB}$	$86.97\pm12.87/90 (5.2)_B$	<0.0001

Different letters in each line represent statically significant differences (Friedman with Dunn post-hoc tests)

Answers using NRS-101 showed statistically significant differences for Time 1 in all questions when compared to Times 2 and 3. Time 3 was statistically superior to Time 2 in questions 1, 3, 5 and 7 (p<0.0001) (table 3).

Table 3. Mean±SD/median (Δ to previous Moment) of answers using 101-point Numerical Rate Scale (NRS) for each question (Q) at the beginning of the course (1st Moment), after lab practice (2nd Moment) and after the clinical practice (3rd Moment)

	1st Moment	2nd Moment	3rd Moment	p
Q1	34.91 ±22.68/30$_A$	57.77 ±18.04/60 (22.8)$_B$	70.77 ±15.25/70 (13)$_C$	<0.0001
Q2	27.54 ±22.42/20$_A$	58.23 ±15.86/60 (30.7)$_B$	60.43 ±19.83/60 (2.2)$_B$	<0.0001
Q3	21.31 ±18.68/15$_A$	69.17 ±18.59/70 (47.8)$_B$	84.77 ±13.43/90 (15.6)$_C$	<0.0001
Q4	73.57 ±15.32/80$_A$	84.74 ±11.19/90 (11.2)$_B$	89.03 ±10.21/90 (4.3)$_B$	<0.0001
Q5	27.71 ±20.16/25$_A$	55.97 ±18.94/60 (28.2)$_B$	68.2 ±15.54/70 (12.2)$_C$	<0.0001
Q6	24.54 ±19.12/20$_A$	54.14 ±17.8/60 (29.6)$_B$	61.94 ±21.6/70 (7.8)$_B$	<0.0001
Q7	21.29 ±18.04/20$_A$	68.34 ±20.43/70 (47.1)$_B$	84.97 ±12.83/90 (16.6)$_C$	<0.0001
Q8	70.97 ±19.8/70$_A$	84.66 ±11.97/90 (13.7)$_B$	88.86 ±9.783/90 (4.2)$_B$	<0.0001

Different letters in each line represent statically significant differences (Friedman with Dunn post-hoc tests)

Using VRS-4 it was possible to observe that time 1 presented significantly lower scores than times 2 and 3 in questions 1 to 3 and 5 to 7 (p<0.0001). Times 2 and 3 were not statistically different in any of the questions. Questions 4 and 8 showed no statistically significant difference among the three applications (p=0.0124 and p=0.0044, respectively) (figure 1).

Self-confidence and trust were significantly different among the three applications using both VAS and NRS-101, increasing during the term (p<0.0001) (figure 2).

Correlation between practical score and students' self-confidence using VAS and NRS-101 were statistically significant (r=0.3352, p=0.0490; and r=0.3848, p=0.0189, respectively). Correlation between practical score and trust using NRS-101 was also statistically (r=0.3771; p=0.0256). There was no statistically significant correlation between practical score and trust when VAS was used (r=0.266; p=0.1225) (figure 3).

4 DISCUSSION

This study was carried out to evaluate the effects of a simulation-based teaching method on the self-confidence and trust of dental students. The findings of this study showed that there was an increase in self-confidence and trust over the period, and a correlation between self-confidence and trust (except for VAS) and practical performance. Overall, students reported being more self-confident and trustworthy at the end of the term compared to the first day of the course. This evolution was noted mainly between the first and second applications of the questionnaires, i.e., after the simulated lab phase on the manikin, which was slightly more important than the clinical experience to increase students' self-confidence and trust.

The present study found increased self-confidence and trust of dental students in performing clinical procedures in periodontics, after performing simulation. These findings are in agreement with those observed in previous studies, which reiterate the importance of simulation in the context of learning in higher education[4,7-10]. It was observed a statistically significant increase in self-confidence and trust assessed by the VAS and NRS-101 throughout the course, confirming the results found in the literature, where authors demonstrated that

simulation practice is an effective method of learning when it comes to development of manual skills and increased trust in performing clinical procedures in real situations[4,8-10].
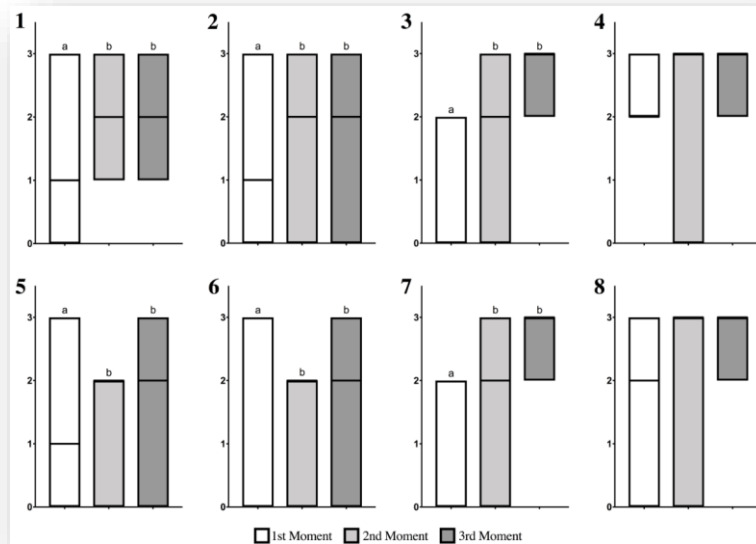

Figure 1. Median, maximum and minimum of answers using the Verbal Rate Scale (VRS-4) for each question (1 to 8) at the beginning of the course (1st Moment), after lab practice (2nd Moment) and after the clinical practice (3rd Moment). Different letters above each column represent statistically significant differences (Friedman; $p < 0.05$)
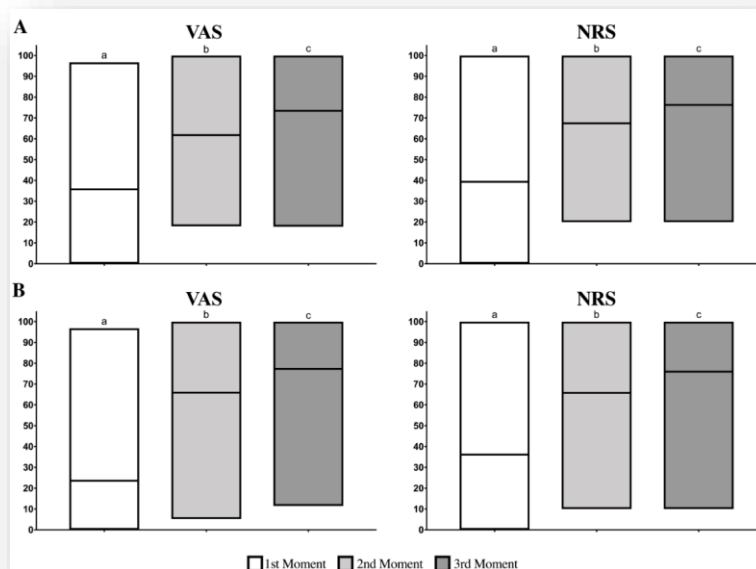

Figure 2. Median, maximum and minimum of answers using the Visual Analogue Scale (VAS) and 101-point Numerical Rate Scale (NRS) for self-confidence (A) and Trust (B) at the beginning of the course (1st Moment), after lab practice (2nd Moment) and after the clinical practice (3rd Moment).
Different letters above each column represent statistically significant differences (Friedman; $p < 0.05$)
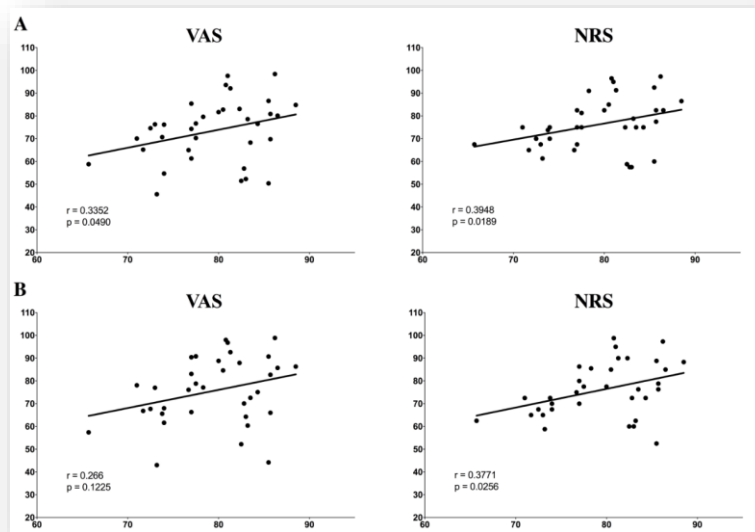
Figure 3. Spearman correlation between practical score and self-confidence and trust using VAS and NRS after the clinical phase.

Clinical experience showed a positive effect, but less expressive in the increase of self-confidence and trust when compared with the training in manikins. Between the initial application and after the lab phase, the increase of these questions was between 11.2 and 49.6 points, while the evolution between the applications after the lab phase and after the clinical phase varied between 2.2 and 18.7. Similar results were observed in other studies, which pointed out that the simulation is not a basis for stating that students are ready to work with real clinical situations without major intercurrences, but can provide greater trust and autonomy when exposed to a true scenario[2, 3,11-14].

As already mentioned in the literature, there was a correlation between the levels of self-confidence and student trust and their final practical score[8]. However, another study found no difference in clinical performance among students who received or not simulated teaching[4].

Three scales were used, which were sufficient to measure a pre-determined parameter in evaluation studies[15]. VAS is sensitive because it has many possibilities of response, but it is difficult to apply and mark. With greater simplicity and ease of application, the VRS-4 has only four response options with description, which facilitates the understanding of respondents, but decreases their sensitivity. The NRS-101 is accurate because it offers anchors that help the respondent to define the response (between 0 and 100), as well as being as simple as VRS-4 for application and marking[16]. The different scales used were aimed at obtaining different variables (discrete numerical, continuous numerical and categorical ordinal), thus covering possible discrepancies between responses of the same individual to the same question.

As limitations of the present study can be cited its observational design, which makes it difficult to explore the differences between the simulation phase in the manikin and the clinical phase. An experimental design in which it would be possible to separate groups for simulated teaching and for clinical experience could better

elucidate the differences found in the results.

5 CONCLUSION

There was an increase in the self-confidence and trust of the students after simulated learning on the manikins in Periodontics, with correlation between these questions and the practical performance. Besides, that teaching method was shown to be slightly more valuable for the evolution of these questions when compared to the initial clinical experience.

RESUMO

Evolução da autoconfiança e segurança de estudantes após aprendizagem utilizando manequins em Periodontia

A simulação no ensino em saúde é uma ferramenta que permite ao estudante uma aprendizagem em ambiente protegido e controlado, livre de intercorrências e com devolutiva instantânea da tarefa desempenhada. Na simulação, o docente pode intervir a qualquer momento, o que o auxilia na avaliação e instrução do estudante. O objetivo deste estudo foi avaliar a evolução da autoconfiança e segurança de estudantes após aprendizagem simulada utilizando manequim em um componente curricular de Periodontia e sua correlação com desempenho prático. Questionários utilizando escala visual analógica (EVA), escala numérica de 101 pontos (NRS-101) e escala verbal de 4 pontos (VRS-4) foram aplicados aos estudantes da Disciplina de Periodontia I da Universidade Federal do Paraná no primeiro semestre de 2018, em três momentos: 1) antes do início das atividades práticas; 2) após a fase laboratorial; e 3) após a fase clínica. Os dados obtidos foram comparados entre si pelo tempo de aplicação e correlacionados com a nota prática final. Os estudantes demonstraram maior autoconfiança e segurança no final do que no início do período (Friedman; p<0,05). Essa evolução foi notada principalmente entre a primeira e segunda aplicações dos questionários, ou seja, após a fase laboratorial simulada em manequim. Houve correlação entre autoconfiança e segurança aferidas pela NRS-101 e o desempenho prático (Spearman; r=0,3948 e r=0,3771, respectivamente; p<0,05). Observou-se aumento de autoconfiança e segurança dos estudantes após aprendizagem simulada em manequim, que se mostrou ligeiramente mais valiosa para evolução desses quesitos em comparação à experiência clínica.

Descritores: Avaliação Educacional. Confiança. Manequins. Periodontia. Laboratórios Odontológicos.

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