Continuous learning evaluation through the application of weekly quiz in Periodontics

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ABSTRACT

Continuous and routine evaluation keeps the student studying, reading and learning permanently, as well as lightens the impact of formal theoretical exams on the traditional criteria for passing a course. The aim of this study was to evaluate the impact of weekly quiz application on the formal theoretical exam score in the course of Periodontics I – a theoretical-practical course – at the School of Dentistry at Federal University of Paraná, Brazil. For this retrospective observational study, the fields "quiz score" and "exam score" of the register book from students of the first and second term of 2016, "no quiz" (n=53) and "weekly quiz application" (n=55), respectively, were analyzed. Formal theoretical exams were identical for both students groups. Data related to the number of quizzes taken by each student and quiz scores were tabulated. Student's t-test and Spearman correlation coefficient test were used for statistical analyses. Weekly quiz application moved the theoretical exam scores curve to the right and scores were significantly greater in this group ($p<0.01$). Besides, there was a significant correlation between theoretical exam score and the number of quizzes taken by each student ($r=0.39$; $p<0.01$), as well as with mean quiz score ($r=0.47$; $p<0.01$). We concluded that weekly application of quiz as an evaluation instrument in Periodontics positively influences acquired knowledge, probably due to stimulating permanent studying.

Descriptors: Educational Measurement. Learning. Periodontics. Observational Study. Education, Dental.

1 INTRODUCTION

Assessment or evaluation in Higher Education should occur throughout the teaching process, including dynamic relationships between teacher and student in learning environments, and should guide decisions related to knowledge[1]. Thus, the evaluation process reveals the competence of the educator and the

appropriateness of the proposal to the pedagogical project[2]. As a matter of fact, traditional forms of evaluation in higher education are challenged as they do not faithfully reflect the student's continuous dedication and commitment, and the need for new proposals and postures in learning environments is urgently urgent[3].

According to the aforementioned educators, the current Brazilian Law of Guidelines and Bases (Law 9394/96)[4], in its article 24, regulates that "the verification of school performance will observe the following criteria: a) continuous and cumulative evaluation of student performance, with prevalence of qualitative aspects over the quantitative and the results of the term over those of eventual final exams (...)". Thus, it is incumbent upon the teacher to find ways to stimulate interest in constant studying and to find effective ways to subsidize the necessary ongoing assessments.

In fact, the use of active learning methodologies is seen as a necessity in Dental[5-7] and Healthcare courses[8,9], and it is recommended by the current Brazilian National Curriculum Guidelines for Dentistry (CNE/CES 03/02)[10]. A recent systematic review identified that the assessment grade of students who received active learning methodologies in the areas of science, engineering and mathematics was about 6% higher than students who received traditional classes, with the latter being 1.5 times more likely to fail an exam[11]. In addition, a study evaluated the use of portfolio as an auxiliary tool during the learning process in Dentistry, and this method of assessment was considered excellent or good and better for learning than the conventional exams.[12]

Among the evaluation techniques, some provide the application of active learning methodologies that go beyond the classroom walls. The challenge, then, becomes to encourage the student to pursue learning and to keep studying outside the class in search of their own learning. Among these active teaching-learning techniques and evaluation, could be cited: the Problem-Based Learning, which presents great potential for use in Dentistry[13]; the flipped classroom, which arises from the prior knowledge of students on the content and has been successfully employed in the teaching of Periodontology[14]; and the use of quiz, which unites the evaluation potential and the possibility of developing active learning methodologies after its application, and has been successfully used in the biological sciences area[15].

Hence, the objective of this study was to evaluate the effect of weekly quiz application in the learning process in the curricular component of Periodontics in the Dental school at the Federal University of Paraná (Curitiba, PR, Brazil).

2 METHODOLOGY

This was a retrospective observational study. The scores of the first theoretical evaluation of the students who attended the curricular component of Periodontics I at the Dental School of Federal University of Paraná during the Fall and Spring terms of 2016, with a workload of 60 hours (30h theoretical and 30h practical), were analyzed. This study was approved by the Ethics Committee in Human Beings of the Health Sector of the institution (Protocol #2.119.596).

Comparison between groups "weekly quiz application" and "no quiz"

Students who attended Periodontics I in the Fall term of 2016 (1st semester) did not receive weekly assessments through the application

of quizzes and were termed *"no quiz"*. With a strictly didactic purpose, the application of weekly quizzes to gauge students' knowledge and stimulate the continuous study began in the Spring term of 2016 (2nd semester). Therefore, the scores of the first theoretical exam of the students of Periodontics I in the second semester of 2016 were used and this group was called *"weekly quiz application"*. Quizzes were considered simple questions (about 3) with direct and short answers (1-2 lines) written freely by the students at the beginning of each class, considering the subject taught in the previous week. The student replied individually to the quiz in a piece of paper containing only their name and the date, without it being necessary to copy the question, which was made orally and with an approximate time of two minutes to answer. No supporting material could be consulted. After each quiz, a brief review of the previous class was offered to create a connection to the topic of the day. Five quizzes were performed before the first theoretical exam considered in this study. It should be emphasized that the first theoretical exam applied in the two semesters of 2016 were identical, allowing the comparison between the two groups. The scores of the first theoretical exam of each student were extracted from the class gradebook.

Correlation between number of quizzes taken and theoretical exam scores

In order to verify if the continuous study and class attendance interfere with the theoretical exam scores, the correlation between the number of quizzes taken by each student and their scores in the theoretical exam was analyzed. This analysis was performed only in the group *"weekly quiz application"*, computing the number of fields "quiz score" completed and "exam score" from the gradebook. The fields "quiz score" that were left open were deducted from the total number of quizzes taken (n = 5).

Correlation between the quizzes and the theoretical exam scores

In order to verify if the performance in the quiz as a result of continuous study interferes with the theoretical exam score, the correlation between the score of the quizzes taken by each student and those of the theoretical exam were assessed. This analysis was performed only in the *"weekly quiz application"* group, through access to the "quiz score" and "exam score" fields from the gradebook.

Statistical analysis

The normal distribution of the data was tested using the D'Agostino-Pearson K2 test. The mean and standard deviation of the theoretical scores of the first exams were compared using the Student's *t* test. The Spearman correlation test was used to evaluate the correlation between the theoretical exam and number of quizzes taken/ quizzes scores. All analyzes were performed on GraphPad Prism 6.0 software for Mac OS X (GraphPad Software, Inc., La Jolla, CA, USA).

3 RESULTS

In total, 108 students participated in the study (53 in the group *"no quiz"* and 55 in the group *"weekly quiz application"*). There were no missing students in the first theoretical exam. In the group with no quiz, the mean (± SD) score of the first theoretical exam was 69.25 ± 13.93 out of 100, while in the quiz group it was 76.75 ± 16.01 ($p < 0.01$; figure 1). Normal distribution of the data was observed ($p > 0.05$) in both groups, with evident displacement of the Gaussian curve to the right in the group "*weekly quiz application*" (figure 2). Regarding the exam scores in the group with quiz, there was a significant correlation with the number of quizzes taken ($r = 0.39$; $p < 0.01$) and quizzes scores ($r = 0.47$; $p < 0.001$ figure 3).

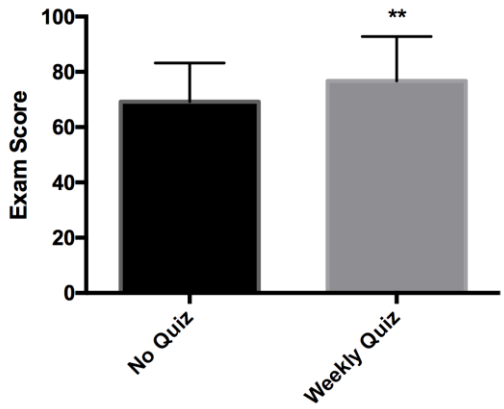

Figure 1: Mean (±SD) theoretical exam scores in the 1st semester of 2016 ("*no quiz*" group) and 2nd semester of 2016 ("*weekly quiz application*" group). ** t test; p<0.01

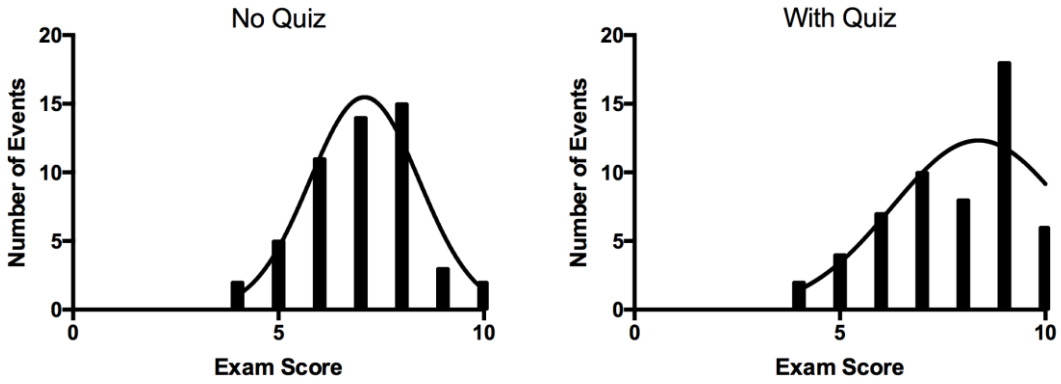

Figure 2: Distribution curve of the theoretical exam scores in the groups with no quiz and with quiz. Note deviation of the curve to the right in the group with quiz.

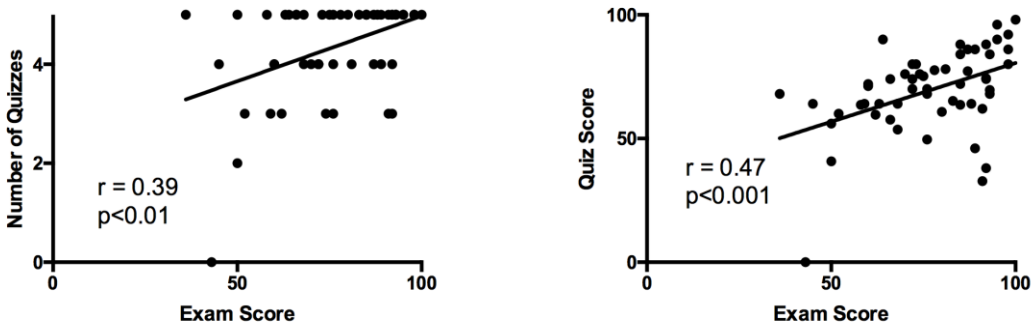

Figure 3: Correlation between the number of quizzes taken by each student (left) and mean quiz score (right) with theoretical exam scores (x axis).

4 DISCUSSION

Difficulty in exercising participatory practices, active and dialogued lectures in health education is frequently reported by educators. This can be understood as a reflection of the academic training of these professionals, in which teaching and learning methodologies are usually teacher- centered[16]. This retrospective study evaluated the use of quizzes in the beginning of each class as a stimulus to the weekly study and its reflection in theoretical exam in a Periodontics I course. The results showed a positive effect of quiz application on the theoretical exam scores. This observation can be explained, besides the stimulus to reading, by the greater interest of the student in the classes due to the use of active methodologies.

According to Carvalho *et al.*, 2016[6], 67% of undergraduate students and 70% of graduate students in dentistry reported never having had contact with active learning methodologies. In addition, all students approved the use of active learning methodologies after being introduced to them[17]. Similarly to the present study, another work identified that the exam scores of students who received active learning methodologies were higher than those of students who received traditional lessons[11]. On the other hand, one study reported that students in the fourth year of the Medical course at the Federal University of Goiás, Goiânia, Brazil, preferred traditional teacher-centered classes, with this type of class presenting a significantly higher students attendance and percentage of accuracy in the evaluations[8].

Only the first semester exam was used in this study. Although the exams were not distributed to the students (except for the test), it would have been possible for the students to write the questions immediately after the exam and to report to the next group; a practice that is inhibited by the teachers. As the exam consisted of objective and essay questions related to basic concepts in Periodontics (anatomy, etiology, pathogenesis, microbiology and immunology of periodontal diseases, epidemiology and modifying factors of the host response), there was hardly accurate record of the questions and their answers.

Assessment through weekly quiz has not replaced the theoretical exam, but contributed with an increase of 25% towards the final score of the student concerning this first module. The other 75% were derived from the theoretical score. Evaluation using quizzes has the advantages of contributing to the formative transmission of knowledge, since it allows the teacher to know the difficulties of the students and thus provide subsidies so that the same can be addressed in a timely manner; decentralize the evaluation process, allowing the evaluation of the studies in a continuous way and not in a single moment; and also encouraging constant reading and studying.

Due to the semi - annual intake of students in the Dental school evaluated, with students entering through a single college entrance examination, it could be hypothesized that those who enter the University in the first semester would show better scores in exams than those entering in the second half. However, Periodontics I course is taught in the fifth semester of the Dental school, and the results showed that the students in the second semester (except for the students eventually not following the recommended periodization) obtained better grades than the first semester students. It is important to notice that this study is retrospective and did not aim to evaluate the data related to students, such as sex, age, form of admission, among others; only their scores. For this reason there was no satisfaction survey related to this form of teaching. Other

prospective studies could better elucidate students' satisfaction and observe sociodemographic profiles related to active methodologies.

5 CONCLUSION

It was concluded that the application of weekly quiz in the teaching of periodontics can be considered a learning stimulation technique and positively reflects on the knowledge of students.

RESUMO

Avaliação contínua da aprendizagem por meio da aplicação de *quiz* semanal no ensino da Periodontia

A avaliação contínua e rotineira mantém o estudante sob constante estudo, leitura e aprendizado, além de suavizar o impacto das avaliações teóricas formais sobre os critérios tradicionais de aprovação. O objetivo deste estudo foi avaliar o impacto da aplicação de *quiz* semanal sobre a nota da avaliação teórica formal no componente curricular Periodontia I do Curso de Odontologia da Universidade Federal do Paraná. Para este estudo observacional retrospectivo, avaliaram-se os campos "nota *quiz*" e "nota avaliação" dos diários de classe das turmas do primeiro e segundo semestres de 2016, respectivamente "sem *quiz*" (n=53) e "com a realização de *quiz* semanal" (n=55). As avaliações teóricas formais foram idênticas para as duas turmas. Os dados referentes ao número de *quizzes* realizados e média das notas de *quiz* foram tabulados. As análises estatísticas utilizadas foram teste *t* de Student e coeficiente de correlação de Spearman. A aplicação de *quiz* semanal deslocou a curva referente às notas de avaliação teórica à direita, sendo que as notas foram significativamente maiores neste grupo ($p<0.01$). Além disso, houve correlação significativa entre a nota da avaliação teórica e o número de *quizzes* realizados por cada estudante ($r=0,39$; $p<0,01$), bem como com a média da nota do *quiz* ($r=0,47$; $p<0,01$). Concluiu-se que a utilização de *quiz* semanal como instrumento de avaliação da aprendizagem influi positivamente no grau de conhecimento adquirido, provavelmente devido a um maior estímulo à leitura e estudo constante.

Descritores: Avaliação Educacional. Aprendizagem. Periodontia. Estudo Observacional. Educação em Odontologia.

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