

Active methodologies in teaching the Removable Partial Denture course during COVID-19: an experience report

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Abstract

This study aims to present the experience of RPD course at the Universidade Federal da Paraíba using active methodologies such as gamification, flipped classroom and case-based learning (CBL) in distance learning, aiming to consolidate learning in planning partially edentulous arches. Activities were carried out synchronously and asynchronously using two-dimensional schemes and photographs of partially edentulous arches as “cases” and based on the concept of the flipped classroom, where students presented the cases and the teachers acted as mediators in the discussions. Excellent engagement and active participation of students in their knowledge construction were observed. The insertion of these methodologies in remote teaching acted as a motivational axis for the students, promoting learning and stimulating development of competences in RPD planning prior to clinical care.

Descriptors: Education, Dental. Online Education. Active Methodologies. Removable Partial Denture. COVID-19.

Metodologías activas em la enseñanza de Prótesis Parcial Removible durante la COVID-19: relato de experiencia de la Universidade Federal da Paraíba

Resumen

Este estudio tiene como objetivo presentar la experiencia del componente curricular Prótesis Parcial Removible de la Universidade Federal da Paraíba con la implementación de metodologías activas, como gamificación, aula invertida y aprendizaje basado en casos, en educación a distancia, con el objetivo de consolidar el aprendizaje sobre la planificación de arcadas parcialmente edéntulas. Las actividades se realizaron de forma sincrónica y asincrónica, utilizando diagramas bidimensionales y fotografías de arcos parcialmente edéntulos como casos, basados en el concepto de aula invertida, en la que los estudiantes presentaban los casos y los docentes actuaban como mediadores en las discusiones. Hubo un gran compromiso y participación activa de los estudiantes en la construcción de su conocimiento. La inclusión de estas metodologías en la enseñanza a distancia funcionó como eje motivacional de los estudiantes, favoreciendo el aprendizaje y estimulando el desarrollo de habilidades en la planificación de la Prótesis Parcial Removible previa a la atención clínica.

Descriptorios: Educación en Odontología. Educación a Distancia. Metodologías Activas. Prótesis Parcial Removible. COVID-19.

Metodologias ativas no ensino da Prótese Parcial Removível durante a COVID-19: um relato de experiência da Universidade Federal da Paraíba

Resumo

Este estudo objetiva apresentar a experiência do componente curricular Prótese Parcial Removível (PPR) da Universidade Federal da Paraíba com a implementação de metodologias ativas, como gamificação, sala de aula invertida e *case-based learning* (CBL), no ensino à distância, visando sedimentar o aprendizado quanto ao planejamento de arcos parcialmente desdentados. As atividades foram realizadas de forma síncrona e assíncrona, utilizando como casos os esquemas bidimensionais e fotografias de arcos parcialmente desdentados, baseando-se no conceito de sala de aula invertida, no qual os alunos apresentavam os casos e os professores atuavam como

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mediadores nas discussões. Observou-se um grande engajamento e participação ativa dos alunos na construção do seu conhecimento. A inserção dessas metodologias no ensino remoto funcionou como um eixo motivacional para os alunos, fomentando a aprendizagem e estimulando o desenvolvimento de competências no planejamento em PPR previamente ao atendimento clínico.

Descritores: Educação em Odontologia. Educação a Distância. Metodologias Ativas. Prótese Parcial Removível. COVID-19.

INTRODUCTION

The COVID-19 Pandemic, caused by the spread of the Sars-CoV-2 virus throughout the world, resulted in the need for social distancing, which immediately resulted in the suspension of in-person classes, as determined by Ordinance No. 343, of 17 March 2020¹. In-person teaching had to be replaced by remote teaching in order to protect students and teachers and minimize the risk of compromising the academic year at universities^{2,3}. Remote teaching based on the traditional model needed to be modified in an attempt to promote greater student participation and engagement through inserting digital platforms associated with active methodologies^{1,4,5}.

Despite the versatility of remote teaching and the efforts of educators to build knowledge, some challenges in this transition were observed, such as internet access, training teachers in the use of online platforms, changing the teaching environment and adapting the traditional methodology⁵. Furthermore, limitations inherent to practical activities that require manual skills, such as the Removable Partial Denture (RPD), needed to be overcome through inserting new methodologies that could assist in developing these skills to the return of face-to-face activities, since practical activities cannot be replaced³.

Remote teaching has already been gradually improved with the implementation of different active methodologies. The flipped classroom is one of the possibilities for a methodological approach where students have contact with teaching materials prior to the online class and discussion about the content is mediated by the teacher, improving learning^{4,6}. Another strategy which has contributed to this teaching modality is gamification, which brings games to the teaching context⁷. Educational platforms such as Kahoot![®] and Quizizz[®] have been used, making it possible to apply the question and answer system through a ranking, encouraging student participation and self-assessment, as well as allowing an analysis of the understanding level about the content^{6,8}.

The use of active methodologies in teaching RPD can be beneficial, with greater effectiveness and greater retention of learning when compared to traditional teaching⁹. A methodology used to boost this teaching is learning based on the discussion or simulation of clinical cases (Case-Based Learning – CBL), in which the student has the opportunity to aggregate the different knowledge obtained and practice applicability of the theoretical study, in addition to develop reasoning and critical thinking individually or in groups¹⁰. Students' preference for using CBL has already been highlighted by Samuelson et al.¹¹ (2017) as an approach to be incorporated into prosthodontics courses in undergraduate Dentistry as a didactic means of teaching, enhancing the ability to diagnose and solve cases.

Thus, the objective of this study is to present the experience of the Pre-clinic RPD curricular component of the UFPB during the COVID-19 Pandemic through inserting active methodologies and learning strategies in remote teaching, seeking to stimulate development of student skills and competencies in planning partially edentulous arches.

EXPERIENCE REPORT

This descriptive study reports the experience of the RPD course of the UFPB - Faculty of Dentistry in the development of academic activities during the COVID-19 Pandemic. COVID-19 was declared a Pandemic by the WHO in March 2020, and the outbreak started in Brazil. As a measure to prevent the spread of the virus, Ordinance No. 343¹² determined the suspension of face-to-face activities in Education Institutions and face-to-face teaching was quickly replaced by remote teaching. Two supplementary periods were offered at UFPB during the 2020 academic year, without the

obligation to offer curricular components: 1. supplementary period 2020.1: from September to December 2020; and 2. supplementary period 2020.2: from March to July 2021.

In this way, the RPD faculty decided to offer the contents of the curricular component as Courses to students who have already graduated from the Pre-Clinical curricular component, which is taught in the 7th semester of the Dentistry Course. The objective was to reinforce learning, consolidate the content already given in the previous semester (pre-pandemic), and to consequently stimulate critical thinking regarding RPD planning, working on content related to the clinical sequence prior to patient care which would be carried out upon return to in-person activities. However, teaching content that is merely practical in a remote way and different from conventionally would be a challenge for teachers.

The RPD component at UFPB is pre-clinical laboratory. In recent years, a philosophical change has been gradually implemented in the pedagogical process, with modifications in the teaching model through insertion of active methodologies during practical classes which were previously published in the literature¹³. The challenge was to adapt these strategies to the virtual environment, where technical (manual) skills training would not be carried out, seeking to involve the student in planning partially edentulous arches using methodologies such as CBL, brainstorming and the flipped classroom.

Two courses were offered to students who had already completed the RPD curricular component on the SigEventos platform during the two supplementary semesters: course 1 - "Removable Partial Dentures Planning"; and course 2 - "Advanced Topics in Removable Partial Dentures". Active methodologies were applied in course 1, focusing on planning the mechanicals components, using two-dimensional schemes of partially edentulous arches developed from a file created in the PowerPoint® program, simulating different Kennedy classes. A more clinical approach with greater complexity was taken in course 2, using images of partially edentulous arches as the "cases" to be discussed. This approach aimed to develop the student's learning regarding the interrelationship of RPD with the Periodontics, Dentistry, Endodontics and Occlusion curricular components, in which hypothetical clinical data were described alongside the cases, making the scenario closer to the reality and seeking to prepare the student for a third course, entitled "Dental Prosthesis: Preparation for the Clinic" taught later (Figure 1). Students who attended course 1 in the first supplementary semester spontaneously attended course 2 in the second supplementary semester.

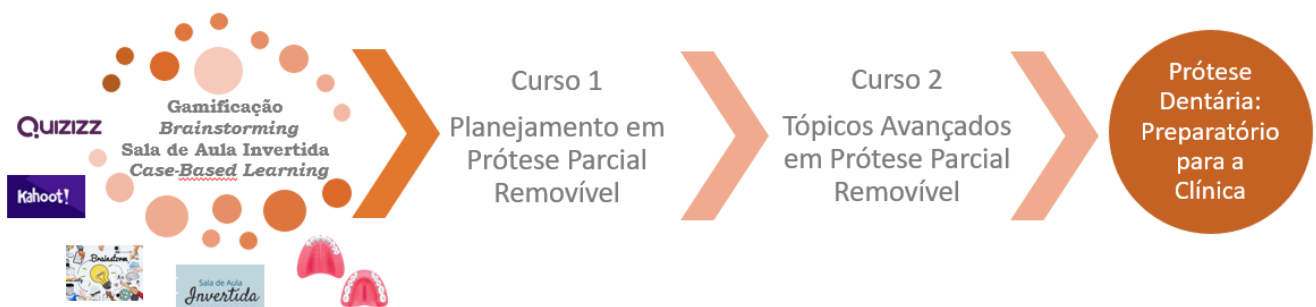


Figure 1. Insertion of active methodologies in Courses 1 and 2.

Group discussion was performed remotely using the CBL technique to consolidate the concepts presented in the previous semester (pre-pandemic), and two-dimensional schemes for course 1 and photographs of partially edentulous arches for course 2. A checklist developed by the authors associated with the cases with a sequence of questions that worked as a guide for resolving cases¹⁴ was also used as a tool. The answers presented to each of the questions enable discussing the concepts of biomechanics in RPD, leading the student to indicate the components of the metallic structure, which also combined with the brainstorming strategy, where students could express themselves for each idea or specific content, contributing to the construction of concepts and problem solving^{16,18}.

The activities of courses 1 and 2 were carried out synchronously and asynchronously. The cases were forwarded to the students at the end of each weekly meeting so that they could carry out the planning and conduct the presentation the following week. The weekly synchronous activities were carried out via the Google Meet® platform based on the concept of a flipped classroom, where students presented cases in pairs. During the presentation, the listening students were encouraged to question, recommend modifications and solve questions regarding the proposed planning, and the teachers acted as mediators, seeking to consolidate the concepts related to the cases (Figures 2 and 3). The teachers also simulated different clinical situations for the case, encouraging critical thinking regarding the different mechanical components proposed. Thus, the aim was to develop the student's competence in planning and selecting the components of the metallic structure, which is a step directly linked to the treatment success.

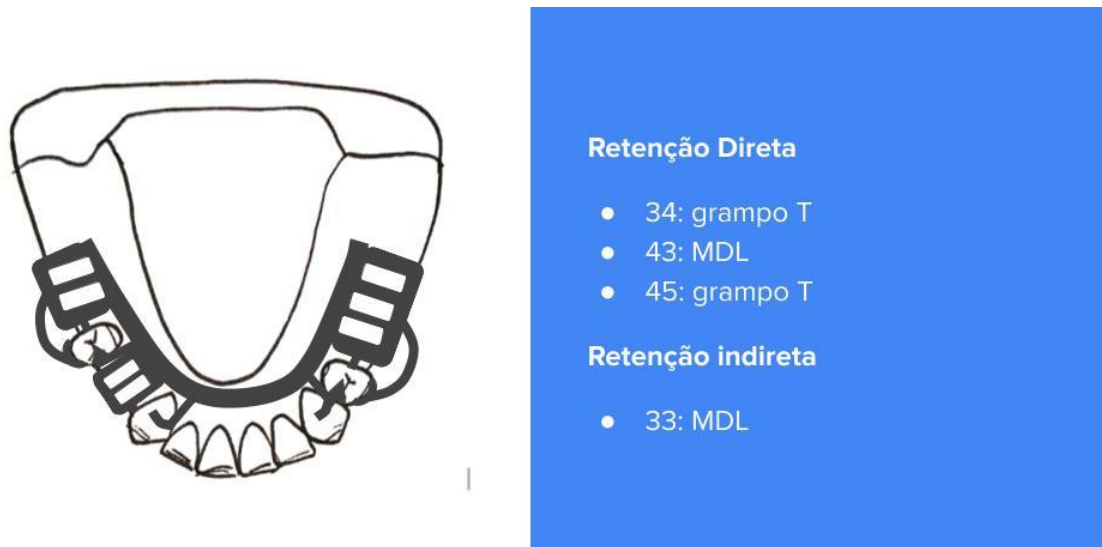


Figure 2. Synchronous Activity in Course 1 based on the concept of a flipped classroom and CBL technique (cases: two-dimensional schemes of partially edentulous arches).



Figure 3. Synchronous activity in Course 2 based on the concept of a flipped classroom and CBL technique (cases: images of partially edentulous arches).

Gamification activities using Quizizz® were implemented in two stages of the courses, and a positive result was observed, with a higher percentage of correct answers by students at the end of the course when compared to the beginning (Figure 4). Excellent engagement and active participation by students in their knowledge construction was observed, resulting in development of an infographic for patients to be used in the clinic (Figure 5).



Figure 4. Gamification activity applied in Course 1 and a comparison of correct answers between the beginning and the end of the course.

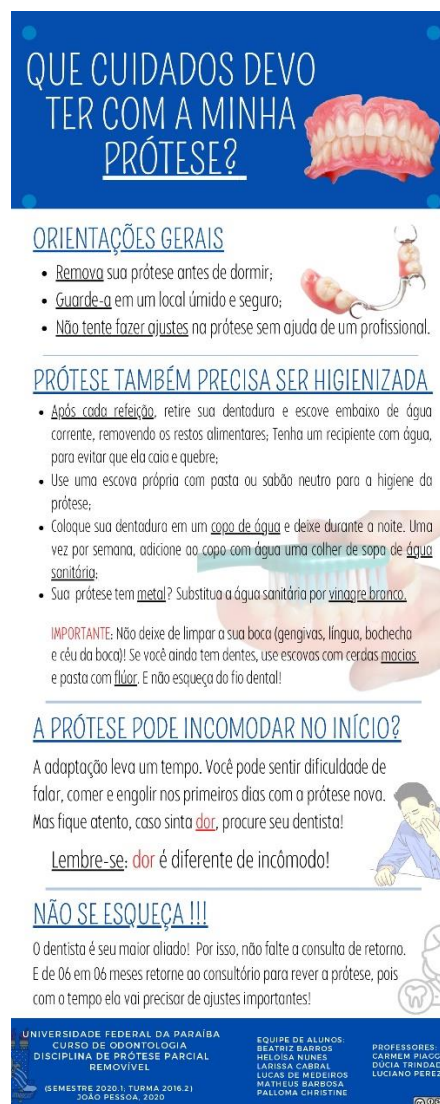


Figure 5. Infographic for patients.

FINAL CONSIDERATIONS

The use of CBL, strengthening of small groups and online classes have already been identified as approaches to be incorporated into the curricular components of prosthodontics in dentistry courses as a didactic teaching method with a positive impact on learning^{11,15,16}. In this context, the activities developed in these courses during the COVID-19 Pandemic involved active methodologies with the aim of encouraging student participation and optimizing learning.

Gamification makes this teaching method more playful and represents a strategy adopted for the education process through games. The Quizizz® platform was applied, which allows applying the question and answer system in real time and generates a ranking based on student performance, encouraging participation and competitiveness. The gamification application moment was well received by students in virtual classrooms; they dynamically interacted, which made active learning even more fun and obtained a more productive result¹⁷. Students could also perform a self-assessment during corrections, and teachers could analyze the level of understanding of the content and reinforce it with students.

Brainstorming consists of a technique based on creativity and student participation, and guided group discussions in both courses. Students give their opinions with their ideas for solving problems through a discussion of topics to expand on a theme without judgment, gradually building learning. Among the benefits of this technique, it is possible to mention an improvement in students' critical thinking skills, synthesis of ideas, expansion of creativity, in addition to stimulating participation and interaction among students. After obtaining positive results in postgraduate studies, brainstorming was also incorporated for undergraduate students with the aim of adding knowledge, being an auxiliary method in the construction of learning and used in association with other active methodologies¹⁸. During the synchronous moments in courses 1 and 2, the technique was guided by a checklist of questions developed by the authors and entitled "Brainstorming in Removable Partial Dentures", where students answered the questions, discussed the biomechanical concepts related to them and indicated the components of the prosthesis, either in front of a two-dimensional scheme of a partially edentulous arch or an image of a clinical case.

The flipped classroom was also adopted in the courses, in which students had contact with teaching materials and experiences prior to the online class, where discussions were mediated by the teacher. This pedagogical tool has the main characteristic of prior knowledge of the subject to be addressed in class through educational videos, scientific articles, podcasts, resulting in greater student engagement during the synchronous class, which requires active participation. Its applicability has not only been reported in the literature in Dentistry, but also in other courses, with a wide diversity of use and with satisfactory results^{6,19–21}.

Finally, the CBL methodology was applied, with learning based on discussion or simulation of clinical cases, in which the student can aggregate the knowledge acquired and apply it, developing critical thinking individually or in groups¹⁰. This teaching modality enables integrating theoretical learning with practice, better preparing students for the cases that will be treated during clinical activities²². Case-based learning consists of an active methodology that results in improved knowledge, stimulating thinking aimed at resolving clinical cases, improvement in communication and interaction among students, in addition to increasing student confidence^{11,23}. The students in Course 2 were more resourceful in planning skills, indicated as being a result of repeating case studies and group discussions carried out in Course 1, which will possibly contribute to defining a protocol to be followed by the student when returning to clinical activities.

Training students' technical skills, such as rest seat preparation activities, designing study models, producing transfer guide crowns, impressions, among others which are essential for training dentists, were not developed during these periods of remote teaching, which is a limitation of this study. However, the inclusion of active methodologies in remote teaching served as a motivation for students during a period of uncertainty regarding the Pandemic and the return to in-person activities. In addition, the development of a direct connection between theory and practice, essential in the health area, enabled developing skills so that students could carry out detailed planning of their patient's RPD in the following curricular components: integrated clinics²².

Therefore, this experience report stands out as a step towards a change in the philosophy of the pedagogical process, which may bring more evident benefits than the traditional teaching model centered on the teacher, predominant in the Removable Partial Denture curricular component throughout Brazil. The inclusion of these methodologies was a

motivational axis for students, fostering learning and stimulating development of skills and competencies in RPD planning prior to clinical care. Therefore, it is suggested that the student-centered process should be encouraged and disseminated, aiming at greater consolidation of learning and more qualified teaching.

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