


Research, teaching and extension: a one-year experience report in a hybrid modality for dental academic training

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Abstract The aim of this paper is to report the experience on the development of activities related to Research, Teaching and Extension during a year of hybrid teaching modality adopted by the Dentistry course at the State University of Piauí. In this context, the present work discusses the development of research projects and the participation in the university's academic monitoring program, adopting not only digital tools but also other teaching practices allowed by the hybrid modality. Participation in a university extension also occupies a prominent place, demonstrating the applicability of the knowledge acquired by the discussion of subjects aimed at the promotion and prevention of oral diseases, as well as the production of online materials to be made available to children during the academic semesters 2020.1 and 2020.2. The present study highlights the importance of Research, Teaching and Extension in a public university in the current moment of facing COVID-19, demonstrating that its development and applicability in an adapted and continuous teaching reality is possible.

Descriptors: Dentistry. Education, Higher. COVID-19.

Investigación, docencia y extensión: relato de experiencia de un año en modalidad híbrida para la formación académica en Odontología

Resumen El objetivo de este artículo es relatar la experiencia del desarrollo de actividades relacionadas con la investigación, la docencia y la extensión durante un año de enseñanza híbrida, adoptada por la carrera de Odontología de la Universidad Estadual de Piauí. En este contexto, se discute el desarrollo de proyectos de investigación y la participación en el programa de seguimiento académico, adoptando no solo herramientas digitales sino también otras prácticas docentes que permite la modalidad híbrida. La participación en una extensión universitaria también ocupa un lugar destacado, demostrando la aplicabilidad de los conocimientos adquiridos a través de la discusión de temas relacionados con la promoción y prevención de enfermedades bucales, así como la elaboración de materiales en línea para ser puestos a disposición de los niños durante el año académico 2020. Este estudio destaca la importancia de la investigación, la docencia y la extensión en una universidad pública frente al COVID-19, demostrando que es posible su desarrollo y aplicabilidad en una realidad docente adaptada y continua.

Descriptor: Odontología. Educación Superior. COVID-19.

Pesquisa, ensino e extensão: experiência de um ano em modalidade híbrida para a formação acadêmica em Odontologia

Resumo O objetivo do presente artigo é relatar a experiência sobre o desenvolvimento de atividades relacionadas à pesquisa, ao ensino e à extensão durante um ano de modalidade híbrida de ensino, adotadas pelo curso de Odontologia da Universidade Estadual do Piauí. Nesse contexto, se discute o desenvolvimento de projetos de pesquisa e a participação no programa de monitoria acadêmica, adotando não só ferramentas digitais como também outras práticas de ensino permitidas pela modalidade híbrida. A participação em uma extensão universitária também ocupa lugar de destaque, demonstrando a aplicabilidade dos conhecimentos adquiridos pela discussão de assuntos voltados para a promoção e prevenção de doenças bucais, bem como a confecção de materiais *online* a serem disponibilizados para o público infantil durante o ano letivo 2020. O presente estudo destaca a importância da pesquisa, do ensino e da extensão em uma universidade pública no momento de



enfrentamento à COVID-19, demonstrando que é possível o seu desenvolvimento e sua aplicabilidade em uma realidade de ensino adaptada e contínua.

Descritores: Odontologia. Educação Superior. COVID-19.

INTRODUCTION

SARS-CoV-2, the etiological agent of the infectious-viral disease COVID-19, causes a cascade of infections in the human respiratory tract ranging from a mild cold to severe respiratory failure¹. The COVID-19 pandemic situation began in the city of Wuhan in China and, since then, has spread rapidly to the rest of the globe, causing a strong impact on various sectors of life in society, including higher education²⁻⁴.

In this context, the preventive measures adopted - such as the mandatory use of disposable masks in public spaces, the degermation of hands using gel alcohol, social distancing and, more extreme, the closure of several educational institutions - aimed to contain the propagation of the virus in the environment, as well as breaking important links in its transmission and ensuring the health of the community⁵.

In view of this measure, it can be inferred that the university environment was transformed as a result of the pandemic caused by COVID-19, permanently affecting the way faculty teach and guide; how students do research and how they participate in university extension⁶.

In this way, universities postponed or canceled campus events, such as workshops and congresses, facing a process of transition to the hybrid modality of teaching to the detriment of the offer of programs and courses previously offered in a fully face-to-face manner⁷.

Blended learning was introduced by higher education institutions (HEIs) in the country during the pandemic scenario caused by COVID-19⁸. This teaching modality combines the use of digital tools for the acquisition of essential theoretical knowledge and face-to-face clinical practice, maintaining an effective and complete health regime, allowing the consolidation of the skills required for the training of a health professional⁹⁻¹².

However, even in the face of the limitations imposed by social isolation, students find ways to adapt and produce¹³. In addition, with the continuous implementation of hybrid modality teaching in HEIs in Brazil, allowing the return of face-to-face practical activities as long as they comply with health standards, the possibilities for students to engage with the pillars of academic training – research, teaching and extension – have increased.

The purpose of this article is to report the experience of developing two research projects; the challenges encountered for the development of activities for academic monitoring and the applicability of the knowledge acquired through the participation of students in extension projects during the 2020 school year in a hybrid teaching modality adopted by the Dentistry course at the State University of Piauí – UESPI in 2021.

EXPERIENCE REPORT

Article 207 of the 1988 Constitution makes research, teaching and extension a mandatory and inseparable triad for higher education in Brazil. These three elements, in addition to contributing to university production, develop the solidarity, social and cultural role of students with the society in which they are inserted^{14,15}.

University research gives rise to a new way of learning for students, consolidating knowledge through methodologies that will make them aware of an object of study and ratify its importance in teaching at the undergraduate level. Therefore, one can only learn by researching¹⁶.

The role of HEIs, especially those in the public sector, as well as their research centers in Brazil, received a prominent place during the times of pandemic and social isolation that afflicted the entire planet, due to the contribution of these institutions with research activities and extension aimed at combating COVID-19¹⁷.

This understanding of the degree of importance of research in Brazilian universities allows the progressive maturation of the student in the trajectory of his graduation and justifies the Institutional Program of Scientific Initiation Scholarships (PIBIC)¹⁸.

In this context, during the two academic semesters of 2020 in a hybrid teaching modality adopted by the State University of Piauí, allowed by the vaccination of all its employees, teachers, students and by adapting its structure to the new sanitary standards required by the COVID-19 pandemic, two research projects were developed: "The perception of undergraduates about the curricular internships for their training in health" – submitted as a voluntary research to the Pro-Rector of Research and Graduate Studies at the State University of Piauí – and "Relationship between dental erosion and dental caries with industrialized grape juice: total soluble solids (°Brix) and pH", submitted to public notice PROP/UESPI No. 001/2020 of PIBIC 2020-2021.

The first study had the participation, as research subjects, of 33 students enrolled in supervised internships in Integrated Clinic and Public Health present in the Pedagogical Project of the Dentistry course at the State University of Piauí. Data collection took place through the application of online questionnaires (Google forms) made available by messaging applications and organized in a spreadsheet for further analysis. Virtual collection was the solution found by the student-researcher and the faculty advisor to overcome the difficulty of face-to-face meetings with research participants during the covid-19 pandemic.

The results of this research showed that the majority of students considered the learning in the curricular internships relevant, a high degree of satisfaction with the activities carried out in the offered internships, the relevance of knowing the social reality through these extramural activities and the importance of the training program. Internships in the Pedagogical Project of the Dentistry course. To this end, all interns were vaccinated against COVID-19, which allowed this fundamental experience for health training. In addition, the interns wanted improvements in the physical structure and the supply of consumables. Among the other suggestions for improving internships reported by academics are a greater workload allocated to the program and advancing this experience before the eighth period of graduation.

The profile of graduates in Dentistry constitutes a major challenge for higher education in Brazil, since trained professionals are required not only generalist technical skills but also a more critical and reflective academic-scientific training bias to be developed during the undergraduate years and to act, after graduation, in all levels of health care, as well as being able to invest in a career as a teacher/researcher¹⁵. From the analysis of the activities developed by the student in his voluntary scientific initiation, it is possible to perceive the reach of such objectives in his training, since, even with the physical and health limitations imposed by the COVID-19 pandemic, the student-researcher was able to adapt and continue the research activities.

Regarding the second PIBIC survey, carried out in person at the university premises and adopting all the sanitary protocols of biosafety and personal protective equipment (PPE) required by the pandemic scenario¹⁹, it consisted of a laboratory analysis of five brands of industrialized grape juice from three different batches, applying the recommended methodology for food analysis with the aid of two portable equipment: a refractometer and a pH meter. Their results showed that the pH levels were below what is considered critical for the demineralization of the hard tissues of the tooth, in addition to having high levels of sugars, which contributes to the onset of caries disease, if there is no adequate oral hygiene.

This research reached different degrees of importance not only for the academic environment, offering dental professionals a better foundation, with the support of scientific evidence, in guiding their patients regarding the excessive consumption of these products; as well as instructing the community in general about oral hygiene care. The student-researcher was invited by the institution's communication office to participate in a live on its official YouTube channel, during the event "UESPI: Conta pra Gente", reaching other researchers on the various campuses of their University. Still, the results of this research called the attention of the program "Conversa Franca" televised throughout the state of Piauí by the TV station "Antena 10".

Research, extension and monitoring programs are fundamental pillars for academic training, as well as stimulating the interest of undergraduates in teaching, offering them mechanisms that allow them to deepen their knowledge and bring closer the relationship between student and professor in teaching/ learning activities. These pillars of higher education

can be understood as crucial tools in this process, contributing to the learning and professional and personal growth of both students and professors, constituting a space for exchanging experiences and discoveries^{20,21}.

However, in the face of the new coronavirus pandemic, it was necessary to rethink the teaching process applied to monitoring programs, adopting not only digital tools but also other teaching practices allowed by the hybrid modality, such as collaborative learning tools (Padlet, Mentimeter and Google Forms) for integrating study groups and facilitating the exchange of information and experiences²² (Figure 1).

Collaborative tools	Description	Performed Activity
<i>Google Meet</i>	Web platform for videoconferencing.	The tool was the main means of meeting all participants, through its resources, interaction between students, the monitor and the teacher took place, sharing screens, audios and reports.
<i>Padlet</i>	Web platform for Real-time collaboration	Applied for student interaction, with sharing of texts and images on topics relevant to the Monitoring discipline.
<i>Google forms</i>	Online-forms platform for real-time interactivity.	Used to exchange information and testimonials during Monitoring meetings.

Figure 1. Collaborative tools used.

Taking advantage of this online-face-to-face interaction, didactic materials were developed on fundamental topics to the Total Dental Prosthesis discipline, such as the anatomy of the edentulous patient, and the organization of discussion groups via the Google Meet platform regarding the experiences of students from the Prosthesis course during the regular semester 2019.2 (prior to the COVID-19 outbreak), showing cases they experienced in the practice of the Dentistry school clinic.

The importance of these actions for the mediation of hybrid learning during the pandemic period still experienced in 2021 is highlighted. Hybrid learning consists of an educational method that combines the use of digital tools for the development of online theoretical classes, while the practical content of disciplines is conducted face-to-face²³. However, the difficulties faced by Brazilian students go beyond just adapting to changes in blended learning strategies, since access to the internet and a home environment that favors concentration during study hours is still a limiting factor²⁴.

In turn, university extension is defined as an undeniably transforming process of interaction between the university environment and the society in which it is inserted, articulating educational, cultural and scientific aspects for those involved²⁵. This pillar of higher education enables the construction and vehicle of knowledge produced within the academy in the face of different realities and meeting the social needs of the country²⁶.

The extension projects aim to produce new knowledge, generating problem solutions in places that are underserved by the public spheres, as well as promoting the reduction of inequality in the most vulnerable sectors of society^{17,27}. This transforming and inclusive social role can be exemplified by the actions developed in the Extension Project entitled "UESPI ODONTO", which takes children, assisted in day care centers by the social project of the Diocese of Parnaíba, guidance on oral hygiene, facilitating dental care for this public and guaranteeing their basic rights, in addition to allowing university dentistry students the opportunity to expand their experiences and skills in the social and clinical context²⁸.

But how to carry out university extension during the pandemic and control scenario for COVID-19? The Extension Project "UESPI Odonto" aims mainly at preventing caries in children who are assisted in day care centers. This proposal arose from the need to transmit knowledge about oral health to this public, with the purpose of raising awareness and changing habits, aiming at reducing the incidence of caries. As these face-to-face activities had not yet returned, students and teachers worked on subjects related to the promotion and prevention of oral diseases, as well as the preparation of

online materials such as videos and posts made by students and published on social networks, such as Instagram, which help and explain about the creation of puppets and macro models used and made available to coordinators, parents, guardians and children in all six daycare centers assisted by the project.

FINAL CONSIDERATIONS

This article highlights the importance of research, teaching and extension at public universities in the face of COVID-19, particularly at the State University of Piau , which adopted preventive measures, vaccination of students and employees, as well as providing opportunities for to students of the Dentistry course the continuity of their practical-on-site training through the adoption of hybrid teaching during the 2020.1 and 2020.2 semesters.

This experience report ratifies the importance of recognizing and continuously discussing teaching, research and extension in public institutions of higher education in the country and their relationships, aimed at training students and committed to a project of country and of society.

In this sense, understanding the university's integrative mechanisms contributes to criticality and dialogue about policies for higher education that, in addition to being committed, are truly feasible, from the perspective of social emancipation and the exercise of citizenship, especially in the pandemic scenario in which society has reinvented itself, in the sense of facing not only the physical, psychological and economic ills caused by COVID-19, but also in the sense of reviewing values, concepts, attitudes and behaviors in relation to traditional teaching-learning, which is characterized for the meeting of students and teachers in a physical environment to conduct theoretical classes in the period leading up to the social distancing measures caused by the outbreak of the new coronavirus worldwide.

The position of the State University of Piau , in the view of inseparability with teaching, research and extension, could be noticed in the return of clinical and laboratory practices during the academic semesters 2020.1 and 2020.2, as it was possible to observe from the actions of confrontation the fight against COVID-19 and the adoption of teaching in a hybrid modality. Even in the face of the limitations inherently imposed by the disease spread by the new coronavirus, students and teachers were able to reinvent themselves and carry out activities to promote knowledge and science, through research, and the contribution to social-academic training through university extension and learning in modality hybrid, because teaching cannot cease.

REFERENCES

1. Heymann DL, Shindo N. COVID-19: what is next for public health? *Lancet*. 2020;395(10224):542-545. doi: [https://doi.org/10.1016/S0140-6736\(20\)30374-3](https://doi.org/10.1016/S0140-6736(20)30374-3)
2. Wu F, Zhao S, Yu B, Chen YM, Wang W, Song ZG, et al. A new coronavirus associated with human respiratory disease in China. *Nature*. 2020;579(7798):265-269. doi: <https://doi.org/10.1038/s41586-020-2008-3>
3. El Zowalaty ME, J rhult JD. From SARS to COVID-19: A previously unknown SARS- related coronavirus (SARS-CoV-2) of pandemic potential infecting humans: call for a One Health approach. *One Health*. 2020;9:100124. doi: <https://doi.org/10.1016/j.onehlt.2020.100124>
4. Sahu P. Closure of universities due to coronavirus disease 2019 (COVID-19): impact on education and mental health of students and academic staff. *Cureus*. 2020;2019(4):4-9. doi: <https://doi.org/10.7759/cureus.7541>
5. Luca GD, Kerckhove KV, Coletti P, Poletto C, Bossuyt N, Hens N, et al. The impact of regular school closure on seasonal influenza epidemics: A data-driven spatial transmission model for Belgium. *BMC Infect Dis*. 2018;18(1):29. doi: <https://doi.org/10.1186/s12879-017-2934-3>
6. Witze A, Callaway E, Mallapaty S, Ledford H, Gibney E. Universities will never be the same. *Nature*. 2020;582(7811):162-164. Available from: <https://www.nature.com/articles/d41586-020-01518-y>
7. Gewin V. Five tips for moving teaching online as COVID-19 takes hold. *Nature*. 2020;580(7802):295-296. doi: <https://doi.org/10.1038/d41586-020-00896-7>
8. Nijakowski K, Lehmann A, Zdrojewski J, Nowak M, Surdacka A. The effectiveness of the blended learning in conservative dentistry with endodontics on the basis of the survey among 4th-year students during the covid-19 pandemic. *Int J Environ Res Public Health*. 2021;18(9):4555. Available from: <https://www.mdpi.com/1660-4601/18/9/4555>

9. Grzeškowiak M, Chudzicka-Strugała I, Zwozdziaż B, Swora-Cwynar E, Nijakowski K, Jokiel M, et al. E-learning during the coronavirus pandemic-creating educational resources for teaching medical students. *Stud logic, Gramm rhetor.* 2021;64(1):77-97. doi: <https://doi.org/10.2478/slgr-2020-0041>
10. Chang TY, Hong G, Paganelli C, Phantumvanit P, Chang WJ, Shieh YS, et al. Innovation of dental education during COVID-19 pandemic. *J Dent Sci [Internet].* 2021;16(1):15-20. doi: <https://doi.org/10.1016/j.jds.2020.07.011>
11. Deery C. The COVID-19 pandemic: implications for dental education. *Evid Based Dent.* 2020;21(2):46-7. doi: <https://doi.org/10.1038/s41432-020-0089-3>
12. Desai BK. Clinical implications of the COVID-19 pandemic on dental education. *J Dent Educ.* 2020;84(5):512. doi: <https://doi.org/10.1002/jdd.12162>
13. Almeida WC, Ferraz MÂAL. Adaptação e produção acadêmica em tempos de distanciamento social. *Rev ABENO.* 2021;21(1):1524. Available from: <https://revabeno.emnuvens.com.br/revabeno/article/view/1524>
14. Brasil. Constituição 1988. Constituição da República Federativa do Brasil. Brasília: Senado; 1988.
15. Silva MF, Mendoza CCG. A importância do ensino, pesquisa e extensão na formação do aluno do Ensino Superior. *Rev Cien Multidiscip Núcl do Conhen.* 2020;8:119-133. doi: <https://doi.org/10.32749/nucleodoconhecimento.com.br/educacao/pesquisa-e-extensao>
16. Soares M, Severino AJ. A prática da pesquisa no ensino superior: conhecimento pertencente na formação humana. *Rev da Avaliação da Educ Super.* 2018;23(2):372-390. doi: <https://doi.org/doi.org/10.1590/S1414-40772018000200006>
17. Silva MRF, Mascarenhas ALLD, Dutra MCFSG, Silva CAF, Dias NS. Reflexões sobre as ações extensionistas e de pesquisa no combate à COVID-19 na universidade do estado do Rio Grande do Norte. *Rev Brazilian J Heal.* 2020;3(2):3622-3646. doi: <https://doi.org/10.34119/bjhvr3n2-191>
18. Severino AJ. Docência universitária: a pesquisa como princípio pedagógico. *Rev @mbienteeducação.* 2018;2(1):120-128. [cited 2023 Apr 10]. Available from: <http://publicacoes.unicid.edu.br/index.php/ambienteeducacao/article/view/540/511>
19. Bsoul EA, Challa SNLP. Multifaceted impact of COVID-19 on dental practice: american dental care professionals prepared and ready during unprecedented challenges. *J Am Dent Assoc.* 2022;153(2):132-143. doi: <https://doi.org/10.1016/j.adaj.2021.07.023>
20. Gonçalves MF, Gonçalves AM, Fialho BF, Gonçalves IMF. A importância da monitoria acadêmica no ensino superior. *Rev Pemo.* 2020;3(1):e313757. doi: <https://doi.org/10.47149/pemo.v3i1.3757>
21. Garcia LR, Jesus AB, Menezes LMS, Mendonça MHR. Como a pandemia pelo novo coronavírus afetou o desenvolvimento dos discentes do 5º semestre de biomedicina de um centro universitário do Estado do Pará: um relato de experiência. *Brazilian J Heal Rev.* 2020;3(4):8145-8154. <https://doi.org/10.34119/bjhvr3n4-074>
22. Santos GV, Ferreira JG, Honorato MCTM, Pereira LL. Desafios da monitoria acadêmica de Estomatologia frente à pandemia COVID-19. *Rev ABENO.* 2021;21(1):1221. <https://doi.org/10.30979/revabeno.v21i1.1221>
23. Yousry YM, Azab MM. Hybrid versus distance learning environment for a paediatric dentistry course and its influence on students' satisfaction: a cross-sectional study. *BMC Med Educ.* 2022;22(1):1-8. [cited 2023 Apr 10]. doi: <https://doi.org/10.1186/s12909-022-03417-4>
24. Ife DAS. V Pesquisa Nacional de Perfil Socioeconômico e Cultural dos as Graduandos as das IFES 2018 [Intenet]. 2019. [cited 2023 Apr 10]. Available from: <https://www.andifes.org.br/wp-content/uploads/2019/05/V-Pesquisa-Nacional-de-Perfil-Socioeconomico-e-Cultural-dos-as-Graduandos-as-das-IFES-2018.pdf>
25. Ciríaco KT, Alves TM, Vaz TRD, Faustino AC, Lima LA, Santino FS, et al. Ações de ensino, pesquisa e extensão e suas potencialidades à promoção de práticas para a educação das relações étnico-raciais. *Brazilian J Dev.* 2020;6(7):43178-43200. doi: <https://doi.org/doi.org/10.34117/bjdv6n7-074>
26. Diniz EGM, Silva AM, Nunes PHV, Franca WWM, Rocha JVR, Silva DSP, et al. A Extensão universitária frente ao

- isolamento social imposto pela Covid-19. *Brazilian J Dev.* 2020;6(9):72999-73010. doi: <https://doi.org/10.34117/bjdv6n9-669>
27. Silva AR. Oportunidades para Extensão Universitária nos Tempos de Pandemia: COVID-19. *Rev Práticas Em Extensão [Internet]*. 2020;4(1):40-41. Available from: <https://ppg.revistas.uema.br/index.php/praticasemextensao/article/view/2181>
28. Sena VS, Falcão CAM, Batista HSA, Silva HO, Primo RM, Ferraz MÂAL. Prevenção de cárie em crianças do Piauí: um relato de experiência. *Extensio Rev Eletrônica Extensão.* 2018;15(30):140-146. doi: <https://doi.org/10.5007/1807-0221.2018v15n30p140>

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