

Challenges in adaptations caused by the SARS-CoV2 pandemic, in a practical discipline taught remotely in the engineering course: a report with possible solutions

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ABSTRACT:Currently, the SARSCoV-2 virus has caused a worldwide pandemic that has brought several negative impacts to different areas in Brazil. As a result, teachers of different ages and institutions had to adapt to teaching practical classes remotely. Thus, this fact makes this moment even more adverse, both for teachers and students, who sometimes did not have support to efficiently use this remote model of experimental teaching. Therefore, this research aimed to expose perspectives and challenges related to the planning of practical classes taught remotely, in classes of a discipline of inspection of milk and dairy products, in an Engineering course at a public university. The proposal focused on the use of Digital Information and Communication Technologies (TDIC) during classes. Despite the challenges faced by both the teacher and the students in this adaptation, the TDIC, ideally, can contribute to the increase of interest, interactivity, opinion formation, and development of skills and competencies on the part of students during experimental classes taught remotely.

KEYWORDS: SARS-CoV2 pandemic; University education; Communication Technologies; Practical classes in engineering; Remote Teaching.

I. INTRODUCTION

Currently, the SARSCoV-2 virus has caused a worldwide pandemic that has brought several negative impacts to different areas in Brazil. So, as a way to prevent the transmission caused by the virus, it is about survival, strictly adhering to the use of masks, social distancing, and avoiding agglomerations. Thus, practical classes in

Higher Education became impossible to be held in person (LI; GUO; CAO; LI et al., 2020).

As a result, teachers of different ages and institutions had to adapt to teaching practical classes remotely (OLIVEIRA; ANTUNES; ITAMAR, 2020). For this, teachers need to formulate lesson planning that takes into account the use of Digital Technologies of Information and Communication - TDIC, to reflect on their practice, to improve their teaching activity in this pandemic scenario.

Thus, this fact makes this moment even more adverse, both for teachers and students, who sometimes did not have support to efficiently use this remote model of experimental teaching (TOMAZ; LOPES; SEITHI, 2020). Therefore, Emergency Remote Teaching - ERE has become the main modality of conducting practical classes, which was adopted by many teachers who strive day after day to adapt and use TDIC resources to benefit from the school year, to minimize in some way, the impacts of the pandemic on student education.

Based on this, this work aims to expose perspectives and challenges related to the planning of practical classes taught remotely, in classes of a higher education discipline. Furthermore, it is also intended to expose criticisms, reflections on possible solutions to this pandemic scenario of experimental remote teaching, through the vision of an active teacher in Regular Education and a volunteer intern teacher in Higher Education.

II. LITERATURE REVIEW

The year 2020 was historically marked by the beginning of a global pandemic moment caused by the SARSCoV-2 virus (RAFAEL; LÁZARO; RODRIGUES, 2021). To prevent transmission and infection, it was necessary to follow the recommendations of health organizations, such as avoiding crowds, wearing masks and social distancing, as a way to alleviate the damage caused by COVID-19 (LI; GUO; CAO; LI et al., 2020).

In this context, although necessary, such measures directly affect education in Higher Education, both in teaching and learning and in the lack of social interaction and practical laboratory experiences provided by the institutions (OLIVEIRA; ANTUNES; ITAMAR, 2020). Thus, all face-to-face practical classes were converted into remote classes, and, in many cases, teachers only use slides and video classes to teach. This fact has a plausible justification, as teachers needed to quickly migrate to the remote teaching model, without being prepared to handle technological resources, making this moment even more challenging, both for teachers and students (DANIEL DE OLIVEIRA; LILIAN, 2020).

Therefore, for teachers to be able to teach remotely, there must be a planning of classes, a fact that needs greater autonomy on the part of teachers, in which it needs to consider the entire context of Emergency Remote Teaching (SILVA; CAMPOS; CHIPOLETTI; AGUILAR, 2020). Thus, even if by ERE, the teacher needs to develop in their planning and classes, adaptation and use of Information and Communication Digital Technology resources to, ideally, obtain the skills and competences that students would develop in hands-on practical classes (CAMILA; SILVIA GABRIELLE BRAZ, 2020).

III. MATERIALS USED

- Computers and electronic devices for teachers and students;
- Internet access through these electronic devices;
- Use of Digital Platforms: Zoom, Google Meeting and Skype;
- Interactive programs such as WordClouds (wordclouds.com) and VirtualLab (<https://virtuallab.pearson.com.br/Laboratorios/Quimica>).

IV. METHODOLOGY

The classes to be taught are for students in the ninth period of the Engineering course at the University of Lavras, located in Brazil. Focusing

on research, the professor developed a Remote Teaching plan for the practical classes to be taught in this pandemic scenario. Thus, identification of the perspectives and challenges expected from this planning, as well as the teaching performance of these classes, were investigated by the trainee teacher who authored the work, in reflections to improve their training and expand the possibilities of technological resources of practical classes taught from the remote way.

The planning of these classes takes into account the discussion of prior knowledge to resume important concepts related to the density and fat of milk and dairy products. Thus, about skills and knowledge construction, the aim is to understand and perform the physicochemical analysis of milk and dairy products, together with their socio-industrial importance. Furthermore, it is intended to identify common errors in hand hygiene before the analysis and their negative influences on the analysis results. Finally, the aim is to conclude, based on the analysis and presentations of the correct form of hand hygiene, highlighting its relevance in social responsibility.

For the development of classes in this thematic unit, which covers classes on physical-chemical analysis of milk and dairy products and correct hand hygiene, it is necessary to use digital dialogue platforms, such as Zoom, Google Meeting, Skype, among others. Thus, the teacher needs to have a computer with internet access and those students have electronic devices with internet access, such as computers or cell phones. For this, it is suggested that the teacher knows relevant digital tools, such as Wordcloud, Youtube, Facebook, Gmail, and What's app groups to provide interactive classes, virtual social moments of discussions, and curiosities.

V. DISCUSSIONS

Based on this current moment, higher education institutions needed to adapt to the model of Emergency Remote Education, as a way to alleviate the damage caused to students, due to this frightening pandemic moment. However, many educational institutions offered little or no training support for teachers to efficiently adapt to this teaching model, especially when it comes to practical classes. Based on this, teachers suffered a lot with the switch to remote learning, which was carried out quickly and urgently, with little or no planning on their part (SILVA; APARECIDA; AMORIM; SUART, 2020).

In addition, many teachers face challenges when they need to master the use of some technological resources during practical classes

taught remotely, which can hinder the process of teaching and learning. This fact is in agreement with Barbosa, Ferreira, and Kato (2020) who found in their research that the lack of training and previous experience of teachers to produce remote activities can harm both the current moment of Remote Emergency Teaching and in future post-secondary education. pandemic.

Despite these adversities presented, teachers may reflect on their teaching practice that is being carried out remotely, as a way to improve the development of experimental classes. For this, the teacher can use interactive technological resources during the delivery of practical classes, which can be combined with inquiries about the student's previous knowledge and contextualized to the classes of physical-chemical analysis of milk and dairy products and hand hygiene, emphasizing the relevance of this thematic unit to social well-being.

To encourage the participation of students, as well as carry out inquiries about prior knowledge, the teacher can use the technological resource WordClouds. This software allows students to quote words about their previous conceptions of the syllabus for the remote practical class, forming a "cloud of words", and the most cited words get bigger in this "cloud" that is presented in time on the computer screen of all students in the virtual room. Thus, teachers have relevant terms to start the class, enhancing the cognitive process of teaching and learning, together with the students.

In addition, to simulate the analysis of density, quantification of fat, determination of the Total Dry Extract (EST) and Dry Defatted Extract (ESD) the teacher can use virtual environments in which simulations and representations of real laboratories are carried out, through the VirtualLab website. With this feature, students can experience, visualize, familiarize themselves with the laboratory and even ideally develop skills that would be performed in face-to-face experimental classes.

Thus, the teacher provides a remote practical class that enhances the interaction between students with a laboratory environment, as a way to facilitate teaching inspection of milk and dairy products. In addition, the use of virtual laboratories can be used for students to develop the autonomy of experiments, relating the theoretical and practical part regarding the physical-chemical analysis of milk and dairy products.

Another interactive mode that may be relevant to this teaching model is the use of applications and websites that encourage writing,

discussions, and social interactions, through social networks, such as groups created on Facebook and What's app. In this sense, the aim is to find ways to encourage the proximity between the students themselves, together with the teacher, in discussions about the importance of correct hand hygiene before carrying out the physicochemical analyzes of milk and dairy products, contributing to critical and reflective training of opinion-forming veterinarians who are active in society (PEREIRA; ESPINDOLA; COSTA, 2020).

Thus, the practical classes of inspection of milk and dairy products taught through Emergency Remote Teaching, are a way to alleviate the damage suffered by students because of the impossibility of practical classes in person in this pandemic scenario. Thus, despite the considerable negative aspects caused by the pandemic, it is still possible to have the development of interactive remote classes that encourage the quality of teaching and learning.

VI. FINAL CONSIDERATIONS

The SARSCoV-2 virus caused a historic global pandemic that began in 2020, in which it is essential to avoid agglomerations and respect the social distance. In this context, education in Higher Education was negatively affected, both in the teaching and learning process and in the lack of practical laboratory experiences provided to students by the institutions.

Therefore, teachers faced adversity when quickly migrating from teaching practical classes in person to teaching practical classes remotely, which sometimes had little or no instruction and training in the use of technological resources. Thus, it is essential and necessary that there is a planning of remote practical classes with the teachers, as a way to alleviate these damages caused by the pandemic in Higher Education in Brazil. Despite this, aiming to overcome some of these negative aspects, it is possible for the teacher to use Digital Technologies of Information and Communication while giving practical classes remotely.

Thus, this fact can be accomplished with the use of interactive resources, such as virtual simulation of a real physical-chemical analysis laboratory, the use of interactive platforms for discussion, and inquiries into students' prior knowledge and social networks. Such resources, ideally, can contribute to the increase of interest, interactivity, opinion formation, and development of skills and competencies on the part of students during remote experimental classes. Thus, it is reasonable to deduce that despite an extremely harmful pandemic moment for engineering

students, it is still possible to have teaching methodologies that provide an improvement in the quality of teaching in remote practical classes for inspection of milk and dairy products.

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