

# Chapter 16

## Student Perceptions of Remote Learning During the COVID–19 Pandemic: A Research Study With Engineering Students

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### **ABSTRACT**

*The Covid-19 pandemic forced some higher education institutions (HEIs) in Portugal to implement remote learning for the first time. In the HEI under study, neither teachers nor students had any previous experience with this type of teaching. Thus, it became important to identify their perceptions about this type of teaching. Thus, after the confinement period, an online survey was carried out with the students of a computer course, and the data were analysed with routine statistical software. In the 42 responses obtained, students reported that the teaching method most used by teachers was videoconferencing (93%), followed by videos of classes (55%) and teamwork (41%). The use of these methods was considered to have little impact on students' performance (48%), with the majority (69%) reporting no impact on their social involvement. It was curious to note that, despite considering that both teaching modalities have advantages and disadvantages, they prefer face-to-face classes.*

### **INTRODUCTION**

Education was one of the sectors that suffered the most from the COVID-19 pandemic. Universities had to be closed, in whole or in part, during the most severe periods of the pandemic, according to the number of positive cases recorded in the regions where they were located. In this scenario, exceptional and rapid measures had to be taken to respond, on the one hand, to the measures enacted by the govern-

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ment and, on the other hand, to continue its mission of providing the most appropriate training to the circumstances, but of quality and demand such as that of higher education.

Within the wide range of activities involved in a HEI (High Education Institutions), some learning activities, such as lectures, symposia, and conferences, easily began to be held by videoconference (Carvalho, et al., 2022), while others, such as practical laboratory classes, were difficult to organize (Carvalho P., The creation of emergency teaching and learning environme: determining factors for the adaptation of stdents and professors of engineering courses in Portuguese Polytechnic Higher Education to hybrid teaching and learning in times of pandemic, 2022).

Fortunately, advances and developments in existing technology have allowed remote learning to be the central procedure for teaching the curriculum during the pandemic. Recent bets by HEIs on the adoption of virtual learning environments (VLE) supported by a learning management system (LMS) have managed to minimize this impact as far as possible as they have become crucial tools to support remote education.

Despite this, it has been a challenge for students who do not have adequate digital resources to the required specifications or internet with sufficient bandwidth/data. According to the study by (Gonzales, McCrory Calarco, & Lynch, 2020) about 20% of students do not have access to laptops/PCs or high-speed internet. In addition, the incorporation of computer-mediated communication during the pandemic required students to use writing more as a way of expressing themselves, articulating ideas, contrasting points of view and presenting opinions. On the one hand, this can stimulate self-reflection (Hawkes, 2001), force critical thinking (Garrison, Anderson, & Archer, 2001) and improve writing (Winkelmann, 1995), these benefits depend on students' perceptions about remote teaching (Ozkan & Koseler, 2009), because according to (Choudhury & Pattnaik, 2020), one of the success factors of e-Learning is the satisfaction of students with both modes of teaching – face-to-face and remote.

Being the field of engineering quite vast, including the fields of science, technology, engineering and mathematics (STEM), are usually taught in various ways combining lectures, tutorials, laboratory exercises, group work and fieldwork. In addition, the curricular programs of the various curricular units of the engineering courses cover several topics with different pedagogical requirements as well as involve a learning methodology strongly based on practice to ensure success. Such diverse content requires ways to disseminate curriculum programmatic content so diverse, as students need to use engineering software tools specific to each curricular unit. Some examples are computer-aided design tools (Solidworks, NX, Autodesk Inventor); finite element analysis tools (ABAQUS, ANSYS); numerical computing tools (MATLAB, Mathematica); system design platforms (LabView, STELLA); statistical tools (R, SPSS); (Behera, Sousa, Oleksik, Jingyan, & Fritzen, 2022) and software development environments (integrated development environments - IDEs) (IntelliJ IDEA, Visual Studio). Since the latter are free to access, others are possible to use with a student license, but most work with expensive licenses, which forces students to have to use the computers located in the classrooms that have the software installed, something impractical in times of past crisis during periods of confinement.

Remote teaching is understood as a teaching model that relies on the use of information and communication technologies to teach the curriculum to students geographically located anywhere outside the classroom. However, it cannot be directly comparable to online education, used in some higher education institutions, both in short courses, as a single method of training, and in degrees, using the hybrid method, combining remote education with the traditional approach. Remote education is less flexible, with strict schedules for classes and interaction with teachers, without prejudice to their being able to communicate using other means, such as by email, at any time. In online teaching, classes are previously

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