

Hands-on Science Education Activities

**Challenges and Opportunities of Distant and Online
Teaching and Learning**

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The Hands-on Science Network



The Role of Synchronous Tools in Online Learning Practices after the Pandemics

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Abstract. The Covid-19 pandemics had most impact on face-to-face education, but online learning was not immune to the changes in all our lives caused by the situation. Imposed lockdown led to greater use of and familiarization with web conferencing technologies, potentially intensifying and driving new ways to learn and communicate in the context of distance education. In this paper we report on a survey on master's students perceptions of the use of synchronous tools in a distance teaching university, before and during the pandemics. The results indicate that students are more comfortable with tools like Zoom, and that they help them to better relate with teachers and classmates, improving their learning.

Keywords. Distance and Online Learning, Synchronous Activities, Web Conference, Lockdown, Collaborative Learning.

1. Introduction

The change in all our lives due to the lockdowns imposed by the COVID-19 pandemics has also impacted on the processes of teaching and learning. Face-to-face universities had to alter their practices, mainly by conducting online classes and subjecting students to online exams, thus trying to replicate in the web environment the presential methodologies they were used to. For various reasons, this replication is not ideal, and they are now adopting strategies typical of tried-and-true distance and online teaching and learning [1-3].

Distance teaching universities, though to a lesser extent, also had to adapt some of their practices. For instance, the portuguese Open University (UAb) moved all its exams online. Other, more subtle (or not officially decreed),

differences occurred, in the behaviour of teachers and students.

In UAb, master's degree in Food Consumption Sciences (MCCA) and master's degree in Web Technologies and Systems (MW) have a duration of 2 academic years. The first year consists of several courses, with different thematics that prepare the student to do a dissertation. In both masters there are compulsory and optional courses, allowing students the opportunity to choose the aspects and themes of most interest to them for their future research. These courses are taught through distance education, with e-learning strategies.

The methodology used follows the pedagogical model adopted by Universidade Aberta [4]. The platform used to support learning activities is the Moodle Learning Management System, and the courses are mostly delivered in Portuguese, with some materials in English.

At the master's level, the Zoom web conferencing platform is sometimes used to discuss themes, presentations and discussion of assignments done by students, as well as to establish contact with other stakeholders and researchers.

In this paper we conducted a survey on the behaviour of students regarding the use and adoption of synchronous tools, such as web conference. We asked students of the two masters' programs (Computer Science and Food Consumption Sciences) their opinions on whether and why their use of web conference has increased and/or improved. Our main goal was to study if more technically trained students such as the ones from Computer Science made greater use of these technologies, compared to the Food Consumption students and the differences behaviours after pandemic situation (1 year and 6 months after Covid19 began).

2. Methodology

We conducted an online survey with LimeSurvey, targeted at two classes of masters' students, both from Computer Science and from Food Consumption Sciences.

The survey started with some questions to characterize the responders:

- Masters program
- Age
- Place of residence
- Have you started to work at home after Covid-19 restrictions began?
- Are there more adult persons working at your home?
- Are there underage persons working at your home?

The bulk of the survey took the form of a series of statements that responders should mark in a 5-point Likert scale, from “completely agree” to “completely disagree”. Two groups of statements were posed, for the situation before the pandemics, and the situation afterwards.

Before the pandemics:

1. I felt that my study program was less accepted than masters' programs from public face-to-face universities.
2. I felt that distance education was underrecognized.
3. I felt uncomfortable with the technology of web conference services such as Zoom.
4. I felt uncomfortable using web conference services such as Zoom, from a social point of view.
5. I appreciated that teachers would promote web conferences, even when they are not planned in the learning contract.
6. I participated in few web conferences during my masters' degree.
7. I created few connections to my teachers, because communication was asynchronous.
8. I had difficulty working with my classmates, because we didn't use web conference tools.
9. In my opinion, distance teaching should be totally asynchronous.

During the pandemics (1 year and 6 months after Covid19 began):

1. I feel that my study program has more acceptance because other universities also had to do online teaching.
2. I feel that distance education became more known and valued.

3. I feel more comfortable with the technology of web conference services such as Zoom.
4. I feel more comfortable using web conference services such as Zoom, from a social point of view.
5. I appreciate more that teachers promote web conferences, even when they are not planned in the learning contract.
6. I participate more in synchronous activities in the masters program, because they use web conference.
7. I created more connection to my teachers, since we talk more in a synchronous way.
8. I work and communicate easier with classmates, through web conference tools.
9. In my opinion, distance teaching should become completely synchronous.

The program used to treat data was STATISTIC We applied Spearman rank order correlations (R) between the responses to the 18 statements of the survey and features: masters program, age of students, living in Portugal versus abroad, change to work at home (yes or no) and have more persons at home. The significance level was placed at $p < 0,05$. In the results we only considered the significative correlations.

3. Results

3.1. Characterization of the sample

Our survey sample had a size of 20 students, 10 from each masters program. The following graphics show distribution of the students in the sample according to age (Fig. 1), workplace and co-habitation with other working persons (Fig. 2 and 3). The majority of students (60%) are under 40 years old, and half of them worked at home during the pandemics. Only 30% of the students had other adults working at home. Only one of the students mentioned having underage persons working at home, so this factor was not considered in the results analysis.

Concerning statement 3, there was significant difference between answers depending on the master's degree they are attending ($R= 0,491354$ and $p=0,027795$). The graph can be seen in figure 10.

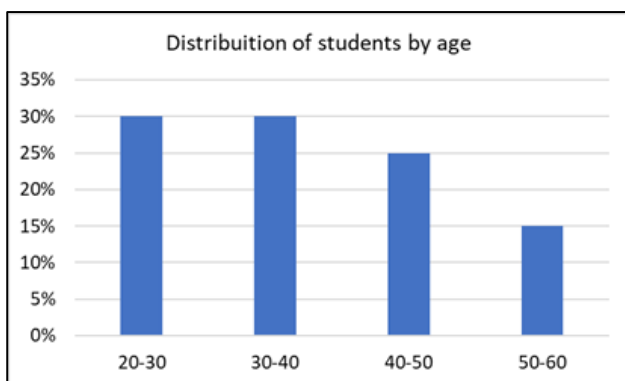


Figure 1. Students' ages

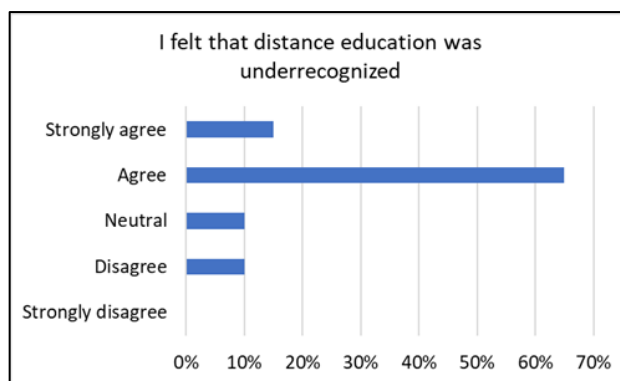


Figure 5. Results obtain to statement 2

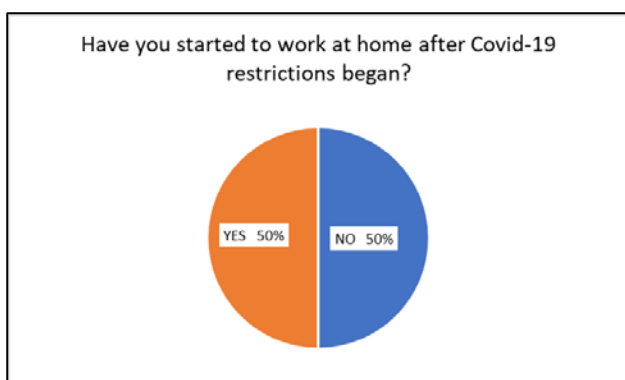


Figure 2. Workplace after pandemic lockdown

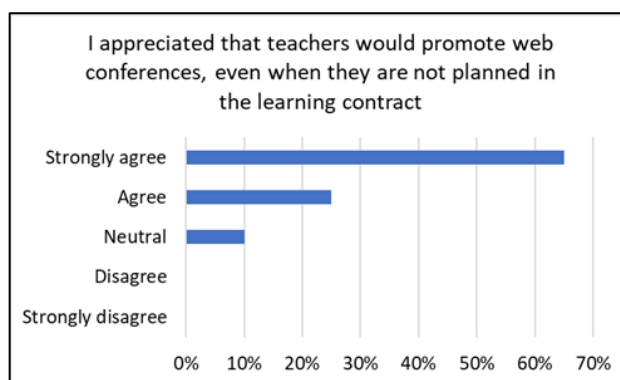


Figure 6. Results obtain to statement 5

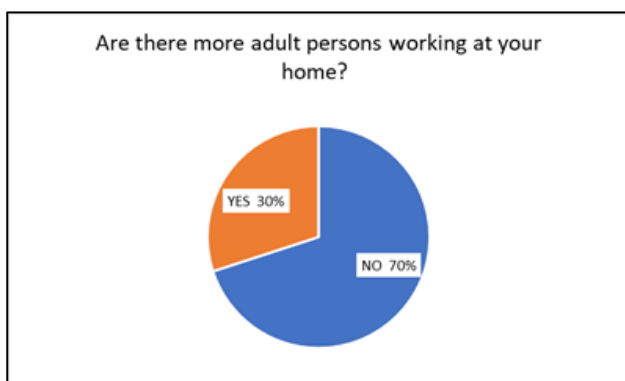


Figure 3. Other adults working at home

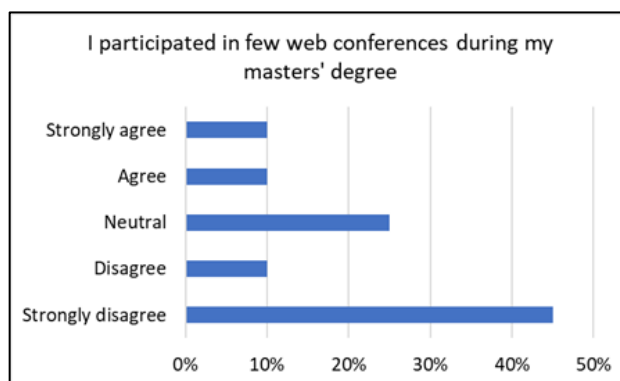


Figure 7. Results obtain to statement 6

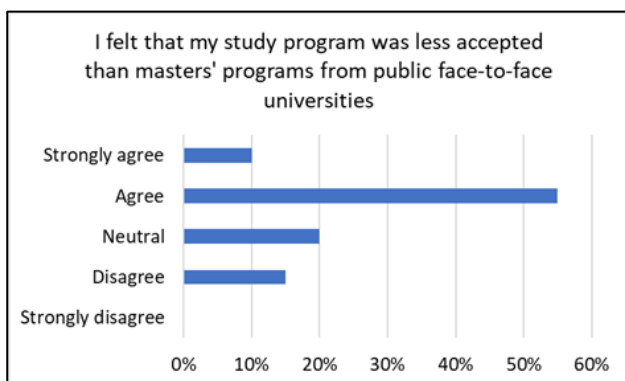


Figure 4. Results obtain to statement 1

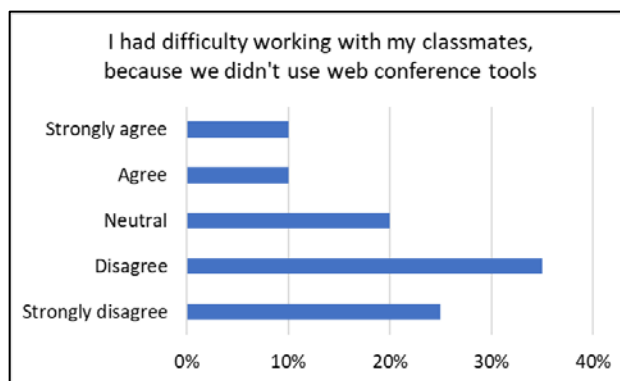


Figure 8. Results obtain to statement 8

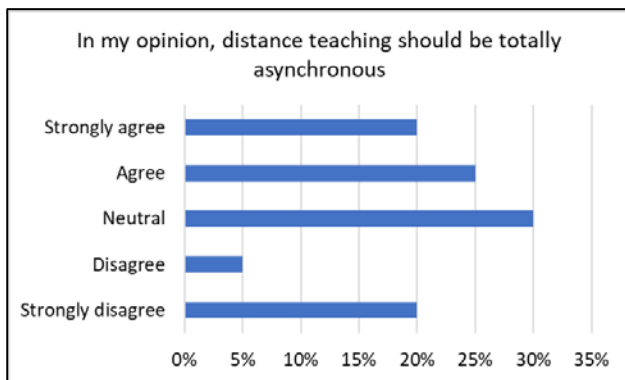


Figure 9. Results obtain to statement 9

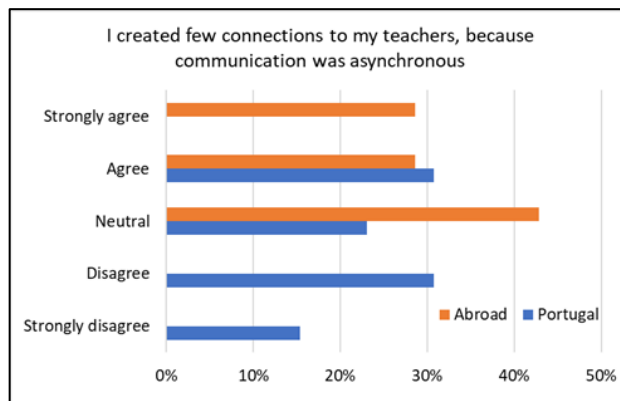


Figure 12. Results obtain to statement 7

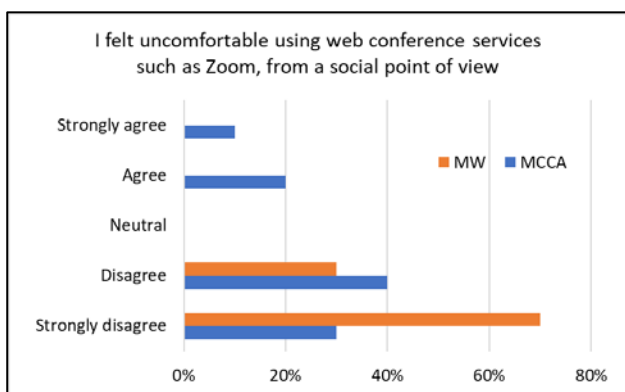


Figure 10. Results obtain to statement 3

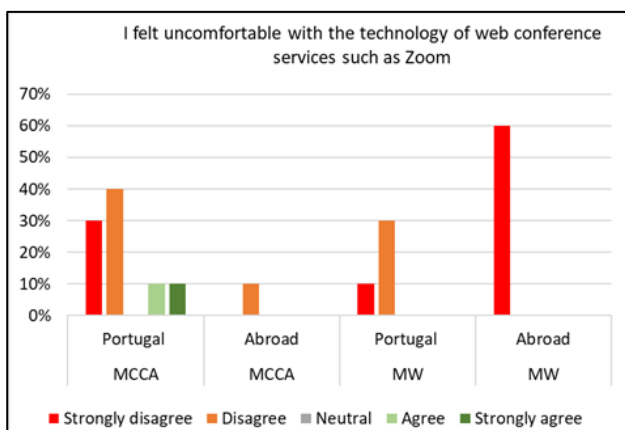


Figure 11. Results obtain to statement 4

Statement 4 also had significant difference between answers depending on the master's degree they are attending ($R=0,465507$ and $p=0,038601$) and localization in Portugal or abroad ($R=-0,527819$ and $p=0,016759$). The graph can be seen in figure 11.

Statement 7 had significant difference between answers depending on where they live: Portugal or abroad ($R= 0,469183$ and $p=0,036892$). The graph can be seen in figure 12.

3.2. After the pandemics

The results of statements where is no correlation found can be seen in figures 13 to 20.

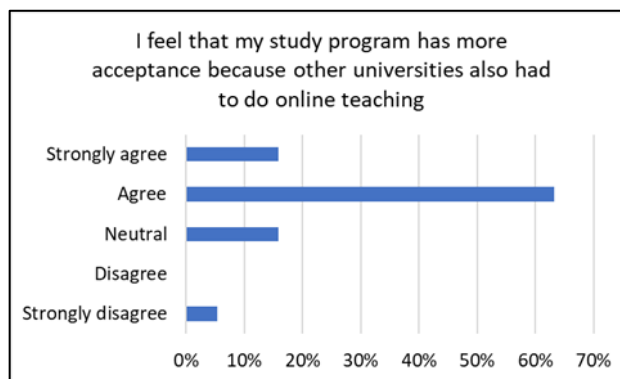


Figure 13. Results obtain to statement 10

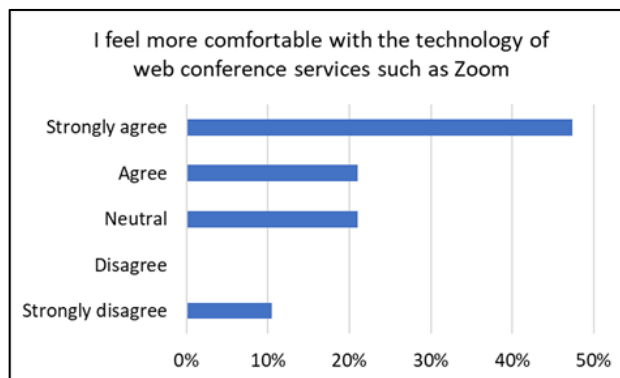


Figure 14. Results obtain to statement 12

Statement 11 had significant difference between answers depending on the master's degree they are attending ($R= 0,520354$ and $p=0,022372$). The graph can be seen in figure 21.

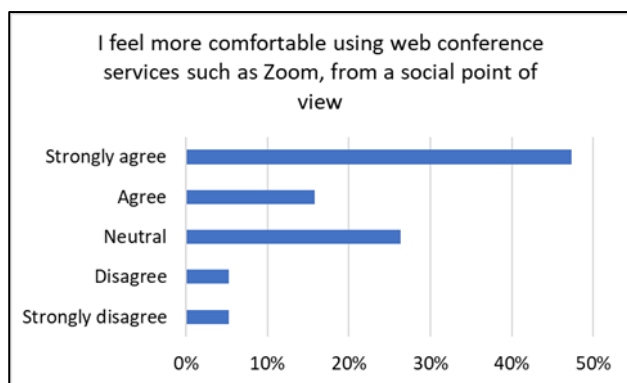


Figure 15. Results obtain to statement 13

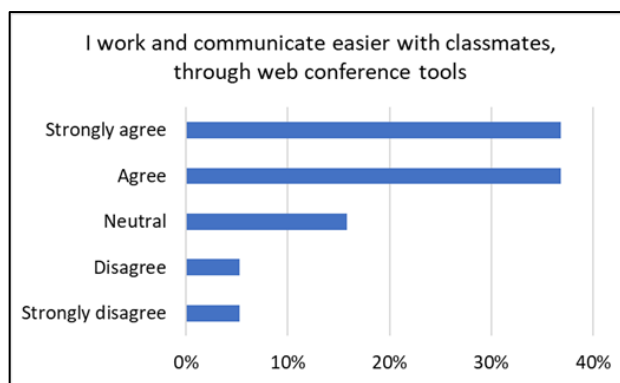


Figure 19. Results obtain to statement 17

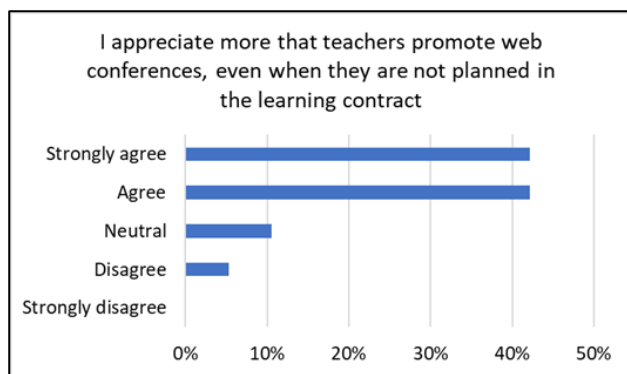


Figure 16. Results obtain to statement 14

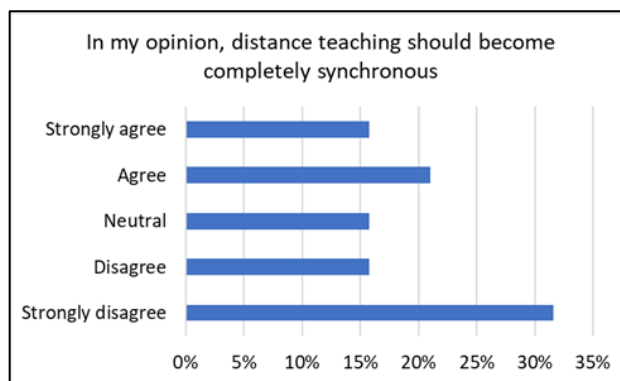


Figure 20. Results obtain to statement 18

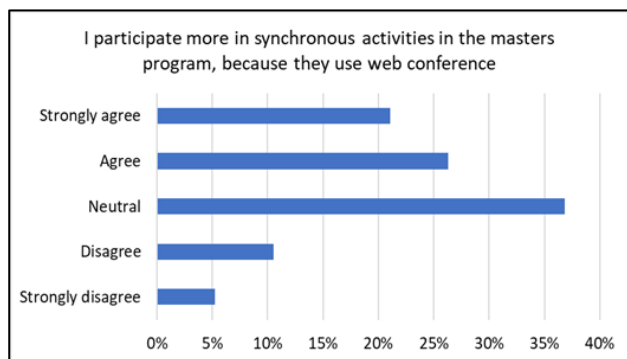


Figure 17. Results obtain to statement 15

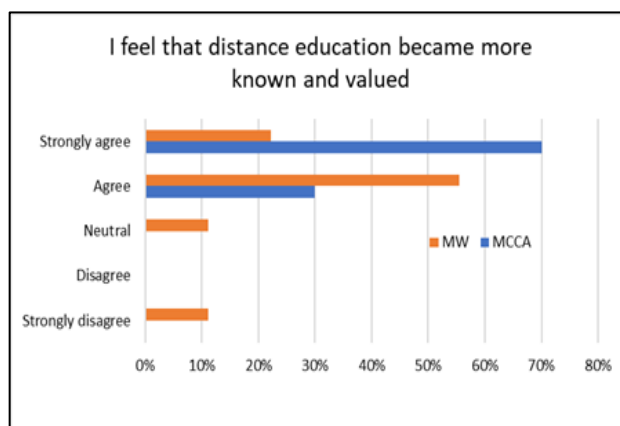


Figure 21. Results obtain to statement 11

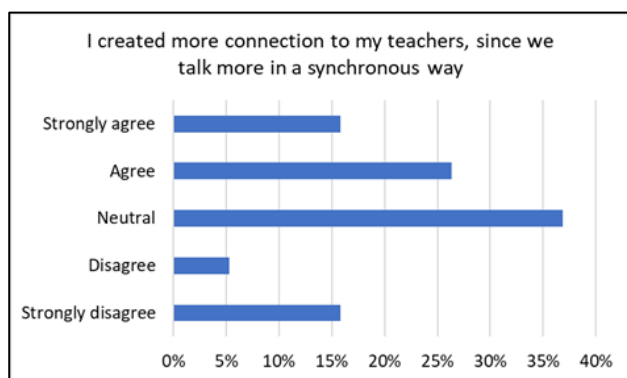


Figure 18. Results obtain to statement 16

4. Discussion and final remarks

The results show that students feel that distance education is more recognized and accepted because of the pandemics – distance methodologies had to be applied to some degree in all levels of education, but also the realization that quality distance learning, demanding proper training and specialization, legitimizes open universities to better provide this kind of education.

Not surprisingly, students from computer science feel more comfortable with synchronous technology, while students from food consumption sciences got necessarily more used to it during the lockdown. Also, students from abroad feel more comfortable with synchronous technology, which can be explained by having to resort more often to videoconferencing tools to communicate with their contacts in Portugal.

As for the online teaching and learning model, most students agree that a completely synchronous model is not suitable, rather benefitting from a combination of synchronous and asynchronous activities. But, since many students worked at home, it is not clear whether, when resuming normal work routines after the pandemics, synchronous activities will be more difficult to attend.

One thing seems clear: more familiarity with videoconferencing tools (both technically and socially) allowed students to develop new learning and communication skills that undoubtedly changes the way they relate to their distance education teachers and classmates, ultimately improving their learning process. Further research is needed to confirm the impact of these more synchronous approaches on academic results, and across other fields of study.

In summary, we found out that synchronous tools have a role in online distance education, especially at post-graduate levels, where students need a more individual support. With the pandemics, the importance of this approach became apparent, as students became more comfortable with the technology and realized that it contributed to increase their proximity to teachers and classmates.

5. References

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