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Adapting course contents to online learning

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Abstract: *The current pandemic scenario that appeared suddenly has surprised the whole world. The education area was not an exception; however, due to existing technology and internet evolution, the negative pandemic impact could be relatively minimized, namely, with the fast migration from traditional presential to online learning. This migration led to a considerable growth of online learning, and this paper purpose is to describe the main advised changes that teachers without online learning experience should adopt when migrating their courses to online mode. These changes should be supported by new technologies to create a motivating and productive learning environment for the students.*

Keywords: *Online learning, internet, pandemic, LMS, VLE, multimedia, interactivity*

I. Introduction

Online learning based on Massive Open Online Course (MOOC) has more than one decade of existence; however, due to the current pandemic scenario, online learning had a massive growth. The main reason is that most of the traditional presential courses, due to health safety reasons, had to migrate to online mode suddenly. Additionally, due to the forced confinement, many people took the opportunity of spending more time at home to enrol in online courses [1].

Therefore, this paper purpose is to describe the advised main changes that teachers without online learning experience should adopt when migrating their courses contents from presential to remote teaching. These changes should take advantage of exiting technology and internet evolution to keep the students motivated and productive [1][2][3].

II. Internet Evolution

The technology evolution supported by the internet constant performance evolution plays an important role in the world economy, especially, in the current pandemic scenario to minimize its negative impact. From the areas that could take advantage of this "opportunity" to grow, we can highlight telework and online learning. It is predictable that even in the future after the pandemic time ends, these areas might keep a number of users much higher than before the pandemic [4].

In the next figures are described the evolution of internet accesses in Portugal and the current average performance for fixed and mobile networks, which play a crucial role to support the success of online learning. Namely, the size of the online student's potential population and the quality of their used synchronous services.

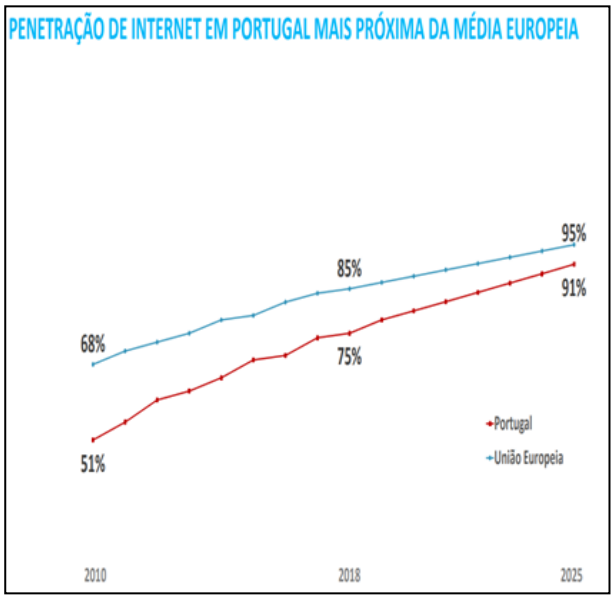

Figure 1: Penetration of internet accesses in Portugal against the European average [5]

For instance, for a high-quality video in a synchronous video conference, the following minimum average access rates should be available for the user's terminals: 1.0 Mbps (Receive) and 1.5 Mbps (Send) [6], which are far below the current average internet access performance in Portugal referred in Figure 2.

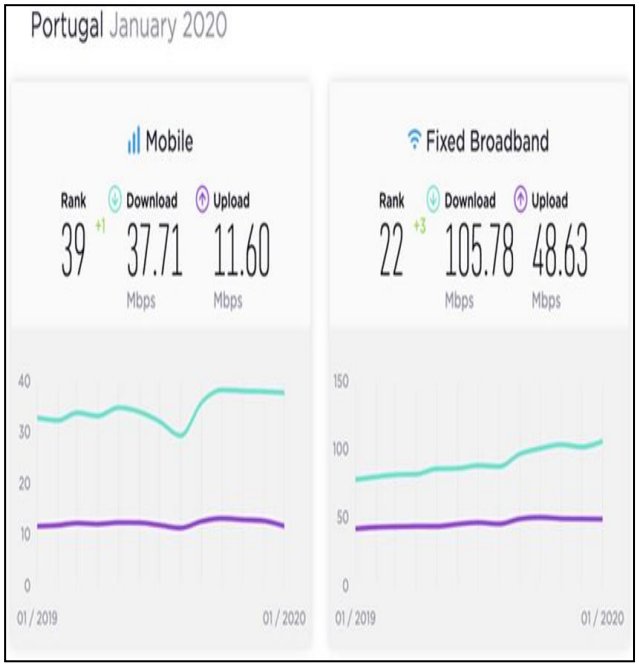

Figure 2: Current average internet access performance in Portugal [7]

For an online synchronous video conference participation, the minimum user requirements should be a terminal, like a PC, with a video conference collaborative tool software and an internet connection with an access rate above the minimum required for a high-quality video transmission. According to Figures 1&2, these requirements should already be fulfilled by almost all college students in Portugal, which should facilitate online learning acceptance.

Finally, the increase performance of mobile networks access should also be highlighted since it might support students and teacher's mobility, whenever necessary [7].

III. Course changes to online mode

Online courses should be given via video conference synchronous online tool controlled by the teacher with class students as guests. In this video conference, the teacher might share with the students some of the same contents already presented in presential classes, like, PowerPoint slides with the main guidelines, which might be the basis for a more deeply and interactive online discussion with students. The synchronous online classes should also be recorded and made available for the students to be able to watch them later asynchronously, namely, students who could not attend the synchronous classes [8][9].

For the video conference, synchronous online classes, real-time collaboration tools via the internet, like Google Meet or Microsoft Teams, can be used. These tools are relatively recent and might support dozens of simultaneous class participants [10].

However, to attract the students' attention and concentration, more likely to be diverted when they are remotely and not on campus in the same classroom with colleagues and teacher, the following other changes are strongly advised which should facilitate the online learning [2]:

Enrich course with multimedia contents:

The class presented contents should be enriched with multimedia information to make them more appealing to motivate and engage students. For instance, the teacher might present synchronous online videos describing the subjects to complement the contents of the slides with a more practical vision. The presented videos contents should also be discussed with students [3].

Increase interactivity with the teacher and between students and their peers:

The interactivity increases with the teacher and between students and their peers is a significant action, namely, to compensate for the lack of traditional face-to-face communication. Therefore, it is advisable to use a Learning Management System (LMS) platform, like Moodle [11], shown in Figure 3, to create a VLE (Virtual Learning Environment) that supports a set of asynchronous interactive learning activities. These activities should provide students with the opportunity to interact with content, peers and teacher in their own time to supplement what is being done in class

synchronously. From these activities, we can highlight the following [12]:

- Discussion forums: to allow students to discuss relevant course topics with their peers and teachers. Therefore, the teacher might periodically setup a subject as forum topic (post) to be analyzed and commented by the students or a student, who might have a question about a subject, might also propose a post to be discussed.
- Wikis: a website developed collaboratively by a community of users, allowing any user to add and edit contents like a shared document. The name comes from the Hawaiian expression "wiki wiki" meaning "very quick". Therefore, as described in Figure 3, the teacher and students might use class wikis to share course relevant information.

Additionally, to encourage students to be more active, doing more thinking, writing, reflecting and interacting with peers to improve their engagement and learning, an online workgroup might also be a good option [12]. This workgroup would also allow the teacher to assess their participation and knowledge. For instance, as described in Figure 3 for a moodle test course created by the paper's author[1], the workgroup could consist of four activities [11][13]:

1) The workgroup would be based on a course contents related case study topic, where the students would have to interact between them and the teacher and apply the learnt course contents. Therefore, the students might create a wiki page in the LMS to present and share the work subjects and other related multimedia contents.
2) For the work preparation, the students might use the LMS wiki to access and share relevant information and the LMS forum to communicate between them or with the teacher.
3) After finishing the topic analysis, like in the real world, the students would have to make a work presentation enriched with multimedia contents.

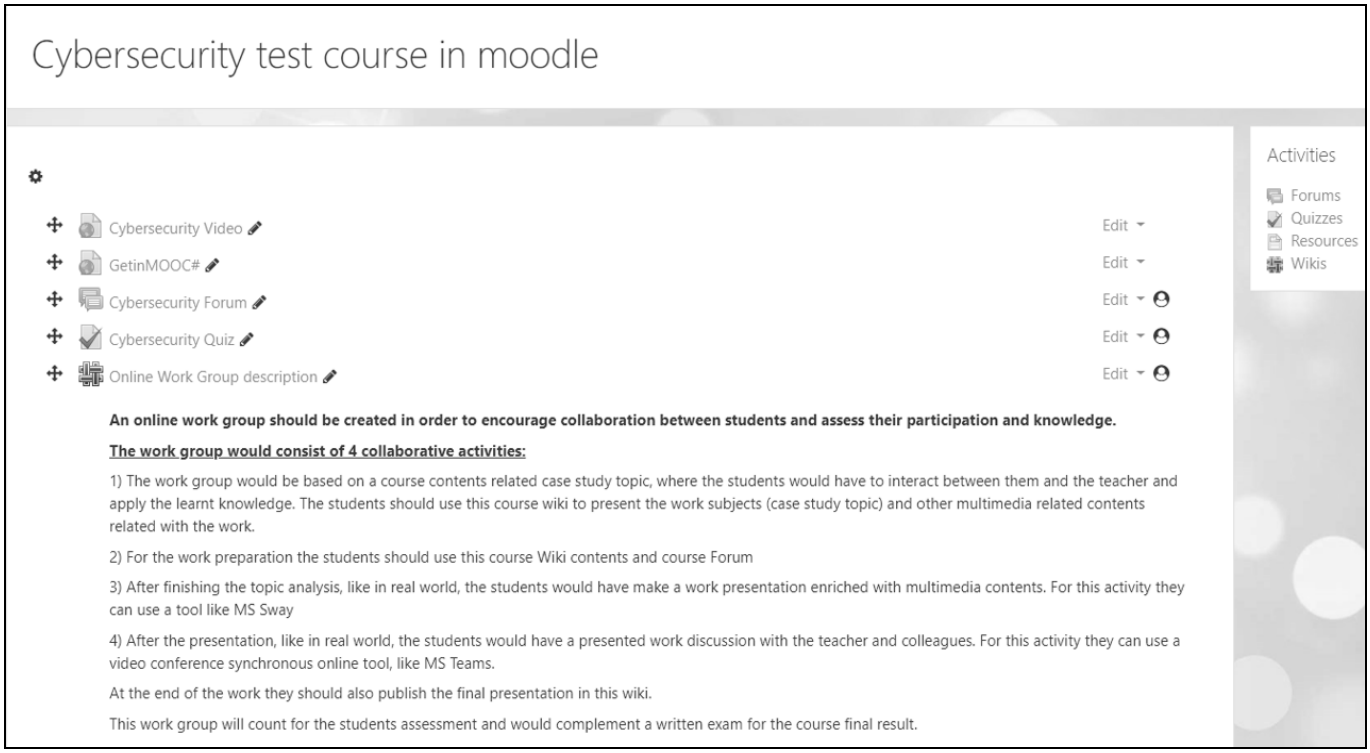

Figure 3: Moodle test course with an interactive workgroup example

[1] https://sergioluzpinto.moodlecloud.com

4) After the work presentation, like in the real world, the students would have a synchronous presentation work discussion with the teacher and colleagues. For this activity, they should use the video conference synchronous online tool already used for the classes.

At the end of the work, they should also share the final presentation in the LMS wiki.

Use Online Assessment:

To motivate students to participate and get engaged during the course, the online assessment should have two components: formative, during the course, and summative, at the end of the course with a final score or mark [14].

Formative assessment enables to monitor students learning, give feedback and also to provide information that might lead to adjustments in teaching. For this purpose, for instance, the teacher might create online quizzes to help students to self-test their basic knowledge and motivate them to the next phase of necessary more in-depth study. Additionally, the feedback from the student's participation in the course interactive activities might also be taken into account for a possible ongoing assessment based on students' involvement and demonstrated knowledge.

The summative assessment might be done based on the student's workgroup performance, as described in the previous section, complemented by an online mode exam, namely, to facilitate students who might live far from the school and are only able to attend online courses. The online assessment should be made with the same tool used for the synchronous online classes. The class size should not be of more than twenty students, and during the exam, the students must always have their camera turned on to discourage possible contacts between them during the exam. However, for students who might have bad internet access or other relevant reasons, it should be accepted that they come to school to make a presential assessment [3].

Finally, it should be highlighted that all these advised changes allow online course design to be more than transferring contents to online or replicating face-to-face classroom sessions. Instead, they ask for a content redesigning for an online environment, rethinking course goals, assessments and learning experiences. Additionally, all these changes are only possible with the currently available communication and learning technologies support, that also contribute to making the learning procedure more appealing, motivating and productive for the students [12].

IV. Conclusion

Due to the technology massive evolution, the current pandemic scenario impact could be relatively minimized, namely, in the learning environment. However, some course adaptations are advisable, and this paper describes the activities that should be used for this online learning adaptation to take advantage of the technology evolution to make the learning procedure more appealing and motivating to engage students. Additionally, these activities purpose are also to overcome the students' probably main disadvantage in remote learning: the possible lack of attention and concentration, more likely to be diverted when they are remotely and not on campus in the same classroom with colleagues and teacher [2].

Finally, we should emphasize the pedagogue key role that a teacher must maintain in online learning. Consequently, the teacher should be available to interact individually with all students, even outside the classes. For instance, is available for online chats or exchange e-mails for questions that the students might ask. Additionally, to get better students' performance, the teacher should always be open mind to make adjustments and improvements in the course contents and activities [3][15].

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I. Abbreviations

LMS	Learning Management System
Mbps	Mega bit per second
MOOC	Massive Open Online Course
MOODLE	Modular Object-Oriented Dynamic Learning Environment
VLE	Virtual Learning Environment