The Impact of Videos on Higher Education Courses

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ABSTRACT
Nowadays, higher education institutions aim to adapt their teaching methods with the recent technological evolution, which affects not only the learners but also the instructors. Such a change in society can be used to minimize a very common concern in higher education: students’ academic lack of success. This lack of success can be addressed through strategies to captivate and engage students with the course topics and the learning system itself. An example of such a strategy includes the adoption and integration of different formats of content and study materials, such as videos. With this research, we analyze how students’ acquisition of knowledge and academic success is influenced by the use of course contents such as videos. Hence, we explore two different scenarios regarding their creation: videos produced by students and videos produced by professors/instructors. Subsequently, these videos were uploaded into a learning software application (Learning Management System), where students from the course were able to access and visualize them.

Keywords
higher education; learning management system; videos; collaboration; student-centered learning; MOOC

CCS Concepts
•Human-centered computing → Human computer interaction (HCI); Haptic devices; User studies; Please use the 2012 Classifiers and see this link to embed them in the text: https://dl.acm.org/ccs/ccs_flat.cfm

1. Introduction
Nowadays, students and professors in higher education face many changes in their learning and teaching experience. Those changes bring new positive aspects and challenges to all the parties involved in the learning and teaching system. One of these changes happens as a result of the learning and technological evolution that we are experiencing in the twenty-first century. Technology has a significant influence not only on teaching and learning but on our society in general. For that reason, institutions need to expand the use of Information and Communication Technology (ICT) tools and integrate these new communication and information strategies in their courses.

1.1 Problem
In the context of higher education, professors and instructors have major recurring concerns throughout a semester. These include, for instance, how to prepare students properly for future class sessions and how to create an active learning environment to engage them with course topics and activities [24]. It is essential to include teaching strategies that aim to prioritize these factors. This can be achieved by prioritizing the students’ experience in the course by including appropriate learning assignments and activities. Studies have further demonstrated [28] [29] that instructional videos are a particular format that helps professors and instructors to achieve their goals regarding students’ engagement and academic success. Learning with online videos has been a widely adopted strategy among higher education institutions, mostly in fully online or blended courses [28]. Professors can address numerous strategies to introduce this type of content in their courses [29]. However, some researches [20] have measured students’ engagement with video activities, and they demonstrate that a passive role with video content is insufficient for learning. Instructional videos may add limited value for student learning if they adopt a passive role with these materials [20] [29] [28]. For those reasons, it’s essential to provide students with activities that enhance their active behavior towards this type of material, in order to take advantage of the potential outcomes from such type of learning content [20].

1.2 Thesis Outline
In Chapter 1, we introduce the problem that gears this work, including a brief description of the motivational aspects regarding this investigation. Besides that, a descriptive thesis outline is performed in this chapter as well. Chapter 2 describes our Research Methodology. The following chapter presents a theoretical background on the topics discussed through this investigation. In Chapter 4, we propose a solution to mitigate the issues described in the previous chapters. Chapter 5 describes the demonstration performed to execute our proposal. Then, in Chapter 6, we describe the techniques carried to evaluate our demonstration. We discuss those results in Chapter 7, in order to provide conclusions in the final Chapter (8).
2. Research Methodology

In this section, we present the research methodology applied in this investigation: the Design Science Research. This method guided us with all the essential steps to carry this research. In addition, we will also introduce the Technology Adoption Framework used in the Evaluation step of our Design Science Research.

2.1 Design Science Research

The Design Science Research (DSR) is a methodology applied in many academic research fields to develop a process that culminates with the production of an artifact. It integrates both design and research procedures. The main goal is to allow a designer to answer relevant questions for human problems through the production of innovative artifacts, providing new information to the body of scientific evidence [26].

An artifact can be defined as something produced by humans to solve or mitigate an existing problem [14]. DSR can be described with six essential steps regarding the creation of an artefact [26]: (1) Problem Identification and Motivation, (2) Objectives of a Solution, (3) Design and Development, (4) Demonstration, (5) Evaluation, and (6) Communication.

2.2 Technology Adoption Frameworks

Technology Adoption Frameworks are essential to assess the introduction of different artifacts/technologies in a specific area (including in higher education), in order to understand all the factors that can influence the use of a given technological tool by the users (on this research, students and professors). A well-known framework to determine and evaluate the use of a new technology method/system is TAM (Technology Acceptance Model). Further examples include the TTF (Task Technology Fit), or the TPC (Technology-to-Performance-Chain). In this section, we introduce the framework applied in this investigation: the UTAUT model.

2.2.1 The UTAUT model

Similar to the models described above, UTAUT (Unified Theory of Acceptance and Use of Technology) aims to describe how people accept the use of a particular technology [31]. The UTAUT model (Unified Theory of Acceptance and Use of Technology), illustrated in Figure 2, consists in an individual acceptance model whose design resulted from the compilation of eight other models/theories such as TAM, TRA, or TPB [12]. This model integrates four different variables/constructs that influence the user’s behavioral intention and behavior (user behavior) [31]: (1) Performance Expectancy, (2) Effort Expectancy, (3) Social Influence, and (4) Facilitating Conditions. This work aims to adopt the UTAUT model since, besides being a compilation of many other models, it has the ability to explain the main reasons for acceptance of a certain technology with more detail (comparing with the other models) [1].

3. Theoretical Background

In this chapter, we will cover all the theoretical background regarding this research. All the topics and concepts that support this work will be introduced and described.

3.1 Student-centered learning methods

In higher education, student-centered techniques can bring many benefits to learners. Professors and instructors should adopt strategies that appeal to students’ self-motivation and confidence by sharing power roles with them [33]. A very popular and relevant student-centered learning theory is the Active Learning. Further examples of such type of theories and concepts are Collaborative Learning, where instructors act as facilitators while groups of students perform tasks with the collaboration of their group peers [27], or Cooperative Learning where each member of a working group is responsible for a specific part of the final project, without compromising their collaborative role in the group [17].

3.2 Active Learning

As mentioned above, Active Learning is a very adopted student-centered learning methodology. Essentially, this strategy states that content mastery and skill development are key factors to help students retain specific topics for long periods, contrasting with surface/passive learning [19]. Active Learning skills such as critical thinking [9] can be induced to students if they repeat the examination of problems and questions by comparing, simplifying and synthesizing information in an analytical, deliberative, evaluative and decisive way [16]. The main idea from this methodology is that a student does not learn by simply listening to professors giving them information and facts passively. They must discuss what they are learning, whether by writing about it, by producing content regarding it or by following another method [5]. They should not only complete the required tasks in their courses, but also understand the reasons behind what they are doing, its importance, and how the skills and knowledge acquired from those tasks can be applied to similar problems and contexts [3]. A well-planned Active Learning should rely on five attributes [18]: (1) Focus on applying content, (2) have interesting instructional material, (3) produce meaningful learning, (4) active, engaging, and technology friendly instruction, and (5) provide opportunities to cooperate and collaborate.

3.3 E-learning

A student who uses any type of Information and Communication technology (ICT) to learn or perform a certain educational task is making use of e-learning [46]. Essentially, E-learning consists in delivering, enabling or mediating something by electronic technology for explicit purpose of learning [8].
3.4 Blended Learning

Blended Learning is a very simple technique used by professors nowadays in order to combine the common learning ("face-to-face") with technological/online learning. This strategy is very popular among college instructors since it is a low-risk methodology that brings effective outcomes in students’ learning and keeps pace with the technological development [34] [9]. This type of learning brings also a new challenge to the traditional learning and universities should find strategies to discover its potential in the future [34]. Advantages from this technique include, for instance, the asynchronous communication (more independence in time and space), or a collaborative learning experience to students [34] [9].

3.4.1 Flipped Classroom

The Flipped Classroom can be considered a type of Blended Learning. Essentially, students enrolled in a course that adopts this model can have access to learning content at home (outside of the classroom) before classes. The goal of allowing students to have an opportunity to be exposed to learning content at home before classes is to provide instructors a better knowledge regarding individual learners’ needs [23]. Then, the in-class time is available to introduce student-centered and active learning activities that aim to clarify doubts and promote problem-solving behavior and collaborative work among students [23].

The core idea regarding this methodology is that "Inverting/flipping the classroom means that events that have traditionally taken place inside the classroom now take place outside the classroom and vice-versa” [21].

3.5 Types of E-learning systems

Professors and institutions have been increasingly adopting e-learning tools to improve traditional learning systems or to replace them with more effective alternatives whose focus is on virtual learning systems. In this section, we will introduce the most popular e-learning solutions adopted by higher education institutions nowadays.

Further examples of e-learning systems include CMS (Content Management System), LMS (Learning Management System), and LCMS (Learning Content Management System). In order to explain and differentiate all of these systems, researchers [7] described three stages to ease their comparisons:

- **First stage:** A Content Management System (CMS) is the most basic e-learning platform that allows the generation of a dynamic website. Its goal is to create and manage online information such as texts, images, graphics, videos, sounds, and others [7].

- **Second stage:** A Learning Management System (LMS) appears after CMS and provides the environment that allows Web updating, maintenance and implications possible with the collaboration of several users [7].

- **Third stage:** Learning Content Management System (LCMS) is a platform that integrates CMS and LMS functions. It incorporates the content management for personalizing the resources for each student and where companies become their own editing entry with self-sufficiency for the content publication. LCMS adds knowledge management techniques to LMS, so that organizations can implement their own processes and practices effectively, with the support of online courses, materials, and content [7].

3.6 Material Content Formats

In this section, we will introduce the theoretical background regarding the use of instructional videos in higher education. Besides that, we will also introduce other types of content formats commonly used in the Learning Management System (LMS) context.

3.6.1 Videos

The research work developed upon this subject of matter indicates that videos explaining course themes and concepts have a positive effect on students’ knowledge achievement regarding a certain topic, helping them to fill learning gaps during their academic path in a certain course. Moreover, this advantage becomes clearer if they develop an active role (active learning) as they carry out their tasks [13]. Videos can play an essential role in teaching concepts. However, students do not learn the course materials effectively by passively observing those videos [4]. The solution is to include interactive elements in order to engage students and enhance their active behavior in the course. This interactive factor can be achieved by browsing, investigating, exploring, choosing, or doing tasks that affect students’ experience while learning concepts with the videos [22].

Another example that can heighten students’ success is the co-creation of study materials (videos, in this case) by themselves. By gathering, applying, analyzing, evaluating, or creating information to produce a video explaining a certain topic, students obtain great retention of knowledge [32], enhancing their learning by reviewing theoretical topics and adapting them to their perspective without compromising their evaluation. They also enjoy the video-creation process, finding it exciting, and without feeling that they are doing homework or another evaluation task [30]. Besides that, it also appeals to their motivation and engagement towards the course [10]. Usually, videos are seen as a very satisfying and practical way of transmitting and obtaining knowledge regarding a certain topic of interest. Therefore, they are highly appreciated by students as a good information retention strategy [25].

3.6.2 Other formats

Besides videos, instructors and professors from numerous courses and institutions have been adopting other content formats to enhance students’ motivation and engagement. These include, for instance:

1. Audio-files/Podcasts;
2. Quizzes;
3. Peer assessment activities;
4. Case studies

4. Research Proposal

In this chapter, we propose a solution to solve our research problem.
4.1 Objectives
This research aims to prove that instructional videos have a positive impact on students and professors in higher education. We intend to prove this positive impact regardless of the context of the production of the videos (student-created vs. instructor-produced). This hypothesis is reinforced with the integration of these videos in online learning environments built by Learning Management Systems, particularly in the case of massive online courses platforms. Another particular aspect that we intend to study with this investigation is that this positive impact is transversal to any course or field of study covered by the curriculum of every participant of this experience. Besides that, another factor that should be studied with this work is that the degree of prior knowledge that each one has regarding a given subject of matter and the mechanisms that involve the integration of videos in a given course does not influence students’ experience with these techniques. Professors are also covered in this hypothesis, as we also intend to show evidence that teaching time is a factor that does not determine the success of implementing this strategy in their courses, regardless of their field of study.

4.2 Description
This investigation has three main proposes that should be addressed:
• The use of instructional videos in higher education contributes on engaging and motivating students with the course topics;

• Instructional videos produced by students or course instructors can enhance students’ engagement in the course;

• The combination of Learning Management System tools with the use of instructional videos contributes to benefit students and professors in many aspects of higher education courses.

Essentially, we investigate a feasible solution that contributes to solve the issues mentioned before, which consists in introducing videos (that expose and explain course topics) as part of the course material. These videos were produced in two different contexts: in some courses, professors or instructors created them. In others, professors instructed students to record them as part of the evaluation process of the enrolled subject, arousing an active behavior of the learners by involving them in the production of the learning material. Numerous studies and projects addressed similar strategies, whether by requesting students to create videos explaining course themes, or creating multiple-choice questions with posterior feedback, for instance.

In all the scenarios covered by this study, all the students had to enroll in an online Learning Management System (LMS) application of the course. The goal of the LMS platform was to provide students with all the required abilities to access and visualize not only the videos but also other relevant course materials supplied by instructors. For that reason, these videos would be available remotely, in order to support each one of the students.

In the first context described above, professors designed and created their course videos. For this purpose, most of these instructors chose to record them in a multimedia recording studio. The recording consisted of a short-length video detailing topics of the course. Furthermore, in some cases, professors asked for the help of video editors that were capable of editing the videos, making them more visually appealing by adding small animations or graphics.

On the other hand, when instructors included the students’ production of the videos in the evaluation process of their subject, students had to enroll in the course platform at the beginning of the semester. A peculiarity from the courses that followed this strategy relies upon the fact that the course material included a literature reference (i.e., a book) containing information and deeper theoretical approaches regarding the topics discussed in class. Then, professors assigned to each student parts of the book (sections, subsections, for instance). Later on, students had to record a short-length video explaining the theme and the topics covered in that segment of the book. This work also assesses the strengths and obstacles regarding this methodology, that affects both student and instructor parties of a course execution.

5. Demonstration
In this chapter, we will detail and demonstrate all the steps regarding our research proposal. This demonstration centers in one of the scenarios described in the previous chapter. In this case, this part demonstrates the scenario where students create the videos (i.e., professors did not record any video of the course).

Participants from this study included Master’s Degree students enrolled in the Computer Science and Engineering program at Instituto Superior Técnico. These participants attended two different subjects: Foundations of Information Systems, and/or Enterprise Architecture. Overall, the range of the number of students attending each one of these subjects was set between 40 and 80 students, depending on the course.

The Enterprise Architecture’s methodology regarding the videos was identical to the one adopted by the Foundations of Information Systems course. However, for the sake of this investigation, this demonstration focused in understanding the Foundations of Information Systems strategy and setting of the videos and the activities involved in their production and dynamics between students and instructors. The group of participants attending this subject comprised 74 students in the first semester of the 2020/2021 school year of Instituto Superior Técnico.

In the beginning of the semester (1st semester of 2020/2021), learners from the Foundations of Information Systems were enrolled in a customised Open edX online platform called MOOC Técnico, a Massive Open Online Course platform that allows instructors to provide different types of content to their students in the course. The platform consists in two different versions: (1) a live version that will be available to students when they log in the platform and where instructors/professors can check and manage all the data available regarding the course itself and the students’ enrollment on it, and (2) a Studio version where the course staff is able to manipulate, configure and manage the platform content: videos, discussion

1https://open edx.org/
units/forum, or exercises (multiple-choice questions, check-boxes, and many others).

The Foundations of Information Systems subject was being taught with the bibliography support of the 14th edition of Management Information Systems book from Kenneth Laudon and Jane Laudon. The book is divided in sections containing more than one subsections each. At the beginning of the semester, instructors assigned to each student a subsection of the book. Then, students had one week to gather relevant information from that subsection and produce Microsoft PowerPoint slides explaining its content. After that, instructors provided detailed feedback regarding students’ submissions, in order to give them an opportunity to correct and improve their slides. At this stage, students were asked to produce presentation notes in each slide of their PowerPoint material. Students were instructed to not exceed a maximum of 30 words in those notes so they could present them effectively in the next stage of the assignment. These notes will be necessary to create the subtitles of the video in further steps.

Having all the slides and the corresponding notes, students had to record a 5-minute video (.mp4 format) presenting the slides as they read the notes. For simplicity purposes and ease of use, the video should be recorded using a Microsoft PowerPoint functionality (Record Slide Show), shown in Figure 3. At the end, the final .PPT file should include all the slides with the notes and the video attached. The final MP4 file consists in the recording of the student’s audio/video and the screen with the slides.

Apart from generating the PowerPoint video in the MP4 format, students should also save the notes in a .txt file. Having the MP4 file, learners had to upload the video (.mp4 file) on Youtube, including the notes in the text file. Using the uploaded video and notes on Youtube, students should then extract an SRT file, a type of file that associates the subtitles of a specific video (in this case, the notes produced by students) with their time information. This subtitle file and the MP4 video would be uploaded in the MOOC Técnico platform. Essentially, all the students’ videos were uploaded to that platform and made available for them to access as many times as they desire until the end of the week where that specific topic was discussed in the lectures.

As part of their evaluation, learners also were expected to assess all the videos on the platform. That assessment was accomplished through the attribution of grades to each video visualized. They also had to analyze six Case Studies (one per week) and a final one in the end of that semester. Then, they had to answer some questions related to them in the MOOC Técnico platform.

Figure 4 shows the video with the subtitles on the right side of the video (in the platform).

6. Evaluation

In this chapter, we explain how the evaluation process of our proposal was executed. The goal of this chapter is to assess all the procedures carried in the demonstration of this research. To the effect, the milestone of this evaluation step consisted in interviewing students and professors from the two courses (Foundations of Information Systems and Enterprise Architecture) that implemented the methodology explained in the previous chapters: introducing and integrating on the MOOC Técnico platform videos created by students.

Additionally, in order to enrich this research and understand the impact of this strategy, we resorted to the contribution of professors and students from other courses to answer questions from the interviews in order to accomplish the assessment of

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3 https://www.springer.com/gp/book/9783642296512
this methodology. We denote for the fact that, in some of the cases, videos from these subjects were created by professors.

6.1 Interviews
To evaluate the mechanisms involved in the videos strategies in the courses, interviews were carried to some professors and students from these courses. These interviews were performed online, using video conferencing software tools (Zoom \(^3\) or Google Meet \(^4\)), and had a duration between 5 to 30 minutes, depending on the availability of each one of the interviewees. In regard to the interviewed professors, a total of 5 (56%) were male and 4 (44%) were females. Three of the interviewed professors (33.3%) have been teaching between 10 and 13 years. Two of them (22.2%) have exactly 22 years of experience in teaching, while the remaining 4 instructors interviewed (44.5%) have between 23 and 33 years of experience.

Most of these professors (five) were teaching Master’s Degree courses, constituting 56% of the interviewed instructors. Two of them (22%) taught and implemented these strategies in Bachelor’s Degree subjects, and the same number of them instructed courses from PhD Degrees (22%, as well). The universe of subjects taught by these professors covers numerous fields of higher education. These fields include Information Systems, Data Science, Epigenetics, Energy Management, Ecology, Physics, and Mathematics. These subjects are integrated into the curriculum of different degrees such as Computer Science and Engineering, Mechanical Engineering, or Bioinformatics.

Table 1 lists all the questions inquired to the interviewed professors. The majority of these questions address the videos’ theme, including the instructors’ (and learners’) experience and the mechanisms involved in applying this methodology in their courses. However, considering the context in which these videos were introduced in the courses, a small part of the questionnaire was also targeted towards online courses, namely the platform on which these videos were made available to students (MOOC Técnico). Aside from these questions, instructors were also approached with follow-up questions (Table 2). These final questions aimed to understand and collect potential aspects that could be improved with these techniques and investigation.

In regard to the interviewed students, a total of 11 (91.67%) were in a Master’s Degree programme, while only 1 student was attending Bachelor’s Degree subjects. Three quarters of these students (75%) were enrolled in the Master’s Degree programme of Computer Science and Engineering in Instituto Superior Técnico. One of the students (8.3%) was registered in the same degree, attending the Electronics Engineering programme, also in IST. Another student (8.3%) from Instituto Superior Técnico was also attending a programme of Computer Science and Engineering, but in a minor degree (Bachelor’s). The only interviewed student (8.3%) from Instituto Superior de Agronomia attended a Master’s Degree programme in Agronomy.

From all the students inquired in the interviews, 10 of them (83.3%) claimed to have never been enrolled in a subject with online activities involving videos. In the opposite way, for two students it was not the first time dealing with an online course (MOOCs). One of them claimed that it was his/her second time enrolling in a MOOC course. The other student had participated in two other massive online courses besides that one, meaning that it was his/her third time being part of a MOOC course.

Another relevant piece of information from this evaluation is the distinction between the scenario where the videos from the courses were produced by professors and the scenario where these videos were produced by students as part of the assessment component. Of all the inquired students, a total of eight (66.7%) had to create a video explaining a specific subject of matter from the enrolled course. On the other hand, four students (33.3%) did not produce any video content for their course. However, they had access to videos created and supplied by their professors.

Table 2 lists all the questions inquired to all the interviewed students. Similar to the professors’ questionnaire, most of these questions address the students’ learning experience and knowledge acquisition as a result of the usage of videos in their courses, but besides that, a few other questions address the online course overall through MOOC Técnico. Students were also approached with follow-up questions in order to understand and collect potential aspects for improvement.

6.2 Analysis
To analyze the responses of students and professors to the questionnaires, the four main variables defined by the UTAUT model were used. Besides that, we considered the behavioral intention relevant to analyze the responses as well. To perform a qualitative analysis of the results, each of the questionnaire responses was allocated to the appropriate construct of the UTAUT model. In this case, the allocation depended only on the context of the question and the answer given. Conse-

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\(^3\)https://zoom.us/

\(^4\)https://meet.google.com/
Table 2. Questions in students’ questionnaire

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<th>Students’ Questionnaire</th>
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<tr>
<td>Q1</td>
<td>What type of online activities have you performed in the course?</td>
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<tr>
<td>Q2</td>
<td>What were the main benefits brought by the online course in the activities/learning?</td>
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<tr>
<td>Q3</td>
<td>What were the biggest challenges (obstacles) faced in attending the online course/use of the platform?</td>
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<tr>
<td>Q4</td>
<td>What were your main expectations regarding the videos?</td>
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<td>Q5</td>
<td>How did the videos live up to your expectations?</td>
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<tr>
<td>Q6</td>
<td>How do you rate your degree of knowledge acquired in videos compared to traditional teaching methods?</td>
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<tr>
<td>Q7</td>
<td>Do you think the videos helped to improve your perception of the content evaluated?</td>
</tr>
<tr>
<td>Q8</td>
<td>If you could, would you choose this method to attend a course in the future?</td>
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sequently, not all questions fit the variables considered by the framework used.

Regarding students, the questionnaire allowed to identify answers that fit the variables Performance Expectancy, Effort Expectancy, Facilitating Condition and Behavioral Intention. Regarding Social Influence, the questionnaire had no questions to support that this factor affected students’ acceptance of this technology. Nevertheless, it is possible to validate this variable if we consider that the study relies on college students, who were influenced by the professors of their courses to produce videos or watch them at MOOC Técnico in order to succeed academically on their tasks. The Facilitating Conditions variable is directly implicit in a few students’ responses. In this case, such construct was detected when students denoted the technical support provided by the professors when producing the videos or using the MOOC Técnico platform.

Additionally, from the results it’s possible to verify that Performance Expectancy and Effort Expectancy affected the use of the technology (videos, MOOC platform) by students. Consequently, there was an impact of these variables on the users’ intentions and behavior to use this technology. This can also justify the students’ aims of using the technology in the future, whose intentions were demonstrated through the answers from the last question of the study. This type of behavior corresponds to the Behavioural Intention’s construct of the UTAUT model. One can also infer that the Facilitating Condition variable affected students’ perception of these technology strategies by the fact that they received feedback and knew that technical support existed while doing their tasks.

For the professors, the questionnaire (and thus, the answers’ context) allowed to associate some of the responses to the UTAUT constructs as well, including Behavioral Intention (due to its relevance in this study). It is also possible to note that the majority of the professors’ responses infer that Performance Expectancy is a very influential factor in the use of the technology, along with Facilitating Conditions granted by the technical support provided by the assistants in the videos’ production. Effort Expectancy also affected the professors’ behaviour towards this technology, mostly due to the degree of ease associated to it. Social Influence affected part of the interviewees as well, considering that in some scenarios, the strategy was adopted by the instructors as a result of suggestions given by third parties (namely coworkers or other instructors), for instance.

7. Discussion

Analyzing all the data collected through the evaluation step of this research, namely the data from the interviews, it is possible to discuss and reinforce essential facts for this investigation. This shows that the interest of higher education professors in adapting teaching methodologies that aim to captivate students through the use and production of videos available in online teaching tools (LMS) is transversal and independent of the number of years that these have been teaching.

Regarding the degree of the courses covered with these interviews, the majority of the inquired professors (and students) were teaching Master’s Degree or PhD courses (50% + 25%), however, another portion of the interviewees instructed Bachelor’s Degree courses (25%). On the side of the surveyed students, the segregation of degrees is similar, with the majority being enrolled in Master’s Degree programs.

Analyzing the data of the distribution of the interviewed students, we can verify that, among students enrolled in Master’s Degree programs, there is a higher variation regarding the context where videos were created: videos produced by students or videos produced by themselves or by their peers. However, this difference favors students that perform an active role in this assessment component since the percentage of students who created videos is higher (80%) than the percentage of students who viewed videos produced by their instructors. On the opposite side, all students enrolled in Bachelor’s Degree programs behave passively in the integration of the videos in their courses. This might suggest that professors and instructors might be apprehensive in attributing to students the responsibility to produce course material contents such as videos, despite their benefits to both parties (learners and professors). For instance, one of the inquired professors claimed that "The amount of time required to record all videos is a drawback in this process". This constraint could be avoided if students from this course were involved in the production of these course resources.

One of the main objectives stated in this research consisted in proving that this methodology could be transversal to multiple fields of study. This assumption can be validated since, from the collected data of the professors’ questionnaire, it was possible to verify that the universe of courses taught by the interviewed professors covered several areas (Data Science, Epigenetics, Physics, for instance). This can be additionally proved can be proved through the surveys data collected while interviewing students as well.

Another assumption from this study regarding students relies in the fact that this learning strategy does not require any further background knowledge in order to be well succeeded. As mentioned in the previous chapter, more than 83% of the students have never participated in such learning environment, where the integration of the videos is a key factor. Students’ levels of satisfaction and learning enhancement stated in some interview answers such (for instance: "I could learn better the
concepts, as I could keep up with all the essential details in everything that is being said in the videos”) prove that students can exploit this mechanism regardless of this condition.

7.1 Professors
The interviews allowed to extract many other remarks regarding this experience such as the benefits and challenges brought to students and professors. Analyzing the professors’ answers to the questionnaires, professors claim that this strategy allowed to enhance the productivity of the classes, considering that students had already studied the class concepts at home. Consequently, the in-person classes became a beneficial excuse to answer students’ questions (flipped classroom). Essentially, instructors stated that their time management had significant improvements as a consequence, without compromising the effectiveness in gathering all the topic modules from the course.

In regard to the challenges faced by these interviewed professors, one of them consists in understand if students can manage the material contents properly. Keeping up with the course topics in a wrong manner could determine if students expose or not their doubts in the class. Another barrier felt by professors regarding this strategy is the decrease in students’ class attendance, despite not compromising their performance. This may (or not) be a trigger for another challenge perceived by some professors: the poor interaction between them and students when theoretical contents are mostly exposed through videos. Another general difficulty faced by instructors included the creation of the videos. Some professors reported constraints in the process of selecting the topics to include in the videos, namely the concepts’ synthesis to produce short videos. Furthermore, in the scenarios where professors created their videos explaining course themes, a big-time and effort was felt by them. This was noticeable when it was the first time introducing this strategy in their courses. Producing and supplying videos into courses whose content is constantly evolving is also a challenge mentioned by the interviewed professors.

7.2 Students
The interviewed students also mentioned many benefits as a result of using videos in their courses. Similar to what professors mentioned, the vast majority of students indicated that the creation/use of these course resources facilitated the study of the topics. Part of that sense of ease existed due to the fact that these videos could be visualized as often as one desired, anytime and anywhere. Therefore, learners felt that they could organize their time study according to their personal preferences. Being easy to understand was also a feature that contributed to the positive perception of these videos among the interviewed students, which reflected in the effectiveness felt by students in using them to practice for exams. The development of soft skills and other personal competencies such as autonomy was another positive outcome mentioned by some interviewed students in this research. According to some interviewees, receiving intermediate feedback during the creation of the videos also contributed to the improvement of these and other relevant skills. This mid-process feedback was also a critical factor that allowed students to improve their marks. Another relevant observation from these interviews relies on the fact that students felt that the introduction of this strategy allowed to break the monotony of classes, making the course more dynamic.

There were also some key factors that challenged students’ general experience with the videos. Basically, the production/use of videos allowed them to enhance their knowledge regarding course topics and concepts. However, part of the interviewees reported communication issues with the professors, as it became more challenging to expose doubts in real time. Despite being an aspect more oriented to the mechanisms and features of the adopted LMS tool, students felt that their experience with videos was affected by this limitation. As mentioned above, students can benefit by creating videos explaining a subject of matter, considering that it is an effective strategy to reinforce their knowledge regarding that topic. However, some of the students felt that it was a challenging task having to learn those concepts for the first time in order to explain them to their peers through a video.

7.3 Expectations and the Future
It has become clear that this learning strategy brings numerous benefits and facilities. Among the professors, several expectations were expected regarding the use of videos in their courses. By producing/using this type of content format, professors intended to facilitate students’ learning, prepare them for certain evaluation moments during the semester, or provide them with more opportunities to study outside of the classroom/home (as a result of the videos’ portability). Besides that, professors were receptive to this methodology in order to provide appealing content to students and to spend less time exposing information by testing to which extent the theoretical contents could be explained remotely. Results also demonstrate that professors aimed to reach more students with the videos and to captivate other colleagues to adopt this strategy in other courses. A positive outcome of this experience is that almost every interviewed professor met their expectations regarding this methodology.

Students’ interviews had a similar outcome regarding expectations. Every interviewee met their initial beliefs and assumptions towards this methodology. These included, for instance, autonomy to learn things by themselves, a greater dynamism and involvement in the execution of the course tasks, or a better technique to learn course concepts effectively. At the end of the interviews, students were asked if, in the future, they would like to enroll in courses adopting this strategy. The majority answered affirmatively, mentioning that such a method is an asset to theoretical contents. Additionally, this research tried to perceive the effects of the videos regarding the degree of knowledge acquired by learners. For this purpose, students were asked to compare their absorbed knowledge during the semester through videos with the scenario where they learned course topics through traditional teaching methods. The majority of the students said that the videos strategy worked better in the course, stating that it was “more easy” and “more dynamic”. For instance, a student claimed the possibility to learn better because one “could catch all the details about the content in the videos”. Other students responded, for instance, that this methodology worked “Slightly better in
the theoretical component of the course (more summarized videos), slightly worse in the practical component of the course because it was more challenging understanding the exercises through the videos”.

Finally, another relevant consideration for this research also relies on students’ interviews. One of the final questions required students to reflect if videos helped them to improve their perception regarding course topics. 100% of the students confirmed this supposition.

8. Conclusion

This research aimed to take advantage of the features and benefits regarding the use of explanatory videos produced by students and/or teachers in higher education. Additionally, part of this investigation also integrated the adoption of Learning Management System tools to support the integration of this type of material in the courses.

This work involved students and professors from different courses and areas who had to adapt and integrate videos in their courses. Those videos were created by students (preferably), or in some scenarios, by professors. The goal was to expose and explain course topics effectively in order to create valuable course content. Learning Management System (LMS) tools supported these videos. In this case, the MOOC Técnico platform supported some of these courses and contents in order to ease the videos’ upload and configuration according to the course modules. At this point, students could access each video and perform related tasks (exercises, case studies, for instance) remotely.

In the final stage, both students and professors were interviewed in order to provide their insights and feedback on this strategy. The results of these interviews allow us to conclude that the use of videos constitutes a good alternative to traditional learning methods in higher education courses. Comparing both video creation scenarios illustrated in this research, videos created by students provided more significant advantages to both students and professors than videos produced by professors. However, this research helped to demonstrate that videos are a useful strategy to engage, motivate, and enhance students with the course topics and activities. Depending on the objectives and milestones established by professors, courses can take advantage of this type of content and learning system to help students succeed academically.

During the development of this investigation, certain obstacles conditioned some variables that would also be interesting to consider in this study. The context of the integration of videos in these courses limited the analysis of other factors and variables that could be relevant to study students’ and professors’ perceptions regarding this learning strategy.

For instance, the fact that students do not have arbitrary decision-making power in the production of the videos can somehow limit the analysis of certain aspects that could influence the students’ decision to perform each of the tasks/actions proposed to them. This limitation happens because students must perform each one of the proposed tasks by the instructors in the course. Otherwise, they fail, suggesting that they don’t have any other option. Essentially, the Technology Frame-

work from this study provided other variables (e.g.: Social Influence) that could have been more explicit in this study in order to contribute with more insights regarding students and professors’ experiences.

After reflecting on the limitations raised in the previous section, we conclude that it would be interesting to go deeper in the investigation to determine how social factors can influence the decision of students to choose (or not) to adopt this type of content material in their academic path. For this purpose, courses should adopt an arbitrary approach regarding the available content formats to students so that there is no negative impact on student assessment.

References


