

ONLINE DISCUSSION FORUMS WITH EMBEDDED STREAMED VIDEOS  
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Existing literature on education and technology has frequently highlighted the usefulness of online discussion forums for distance courses; however, the majority of such investigations have focused their attention only on text-based forums. The objective of this paper is to determine if the embedding of streamed videos in online discussion forums generates educational dialogue and consequently the feedback that students need in a Management Accounting Course. The findings suggest some interesting issues, such as: students prefer text answers except in complex questions, and videos never replace text commentaries and explanations, but rather complement them.

**Keywords** – online discussion forum, streamed video, distance education, educational feedback

**1 INTRODUCTION**

Although most investigators have focused their attention on the use of electronic mail to study the students' feedback on distance courses (Biesenbach-Lucas, 2005), several new communication media such as chatting (e.g. Boling, 2008), videoconferencing (e.g. Anastasiades, Vitalaki & Gertzakis, 2008) and online discussion forums have received more attention over the past few years. Following this trend, Dengler (2008) suggested that the online discussion forum is a tool capable of constructing pleasant educational dialogue, which allows students to improve their learning processes. Equally, Patel and Aghayere (2006) proposed that online discussion forums place the student at the centre of the learning process, which in turn promotes more active learning. Most investigations in this field have focused their attention on text based online discussion forums, whereas the uses of online discussion forums that combine text and video in the same place have received little attention.

Video has been used in different ways for many years to support distance learning in higher education (Shephard, 2003); however, much also remains to be learned about the use of video to support learning. The appearance of digital video and Internet gave way to new proposals and suggestions in the learning and education field (e.g. Coursera). The latest technological advance in digital video has been streaming, which offers various advantages in distance education (Fill & Ottewill, 2006), such as a faster access speed and the ability to combine it with other online resources. In the specific case of accounting education, the number of streaming videos has increased significantly in the last five years (see iTunes U).

Along these lines, the embedding of self-made videos in online discussion forums in order to answer doubts, clarify concepts and raise new questions could consequently provide unexpected benefits in terms of educational dialogue and student feedback (Mazzolini & Maddison, 2003) in a Management Accounting course.

Following a review of the literature in this field two questions arise: Can the embedding of streamed videos in online discussion forums generate educational dialogue and consequently the feedback that students receive? And, if so, what considerations must teachers have in mind when embedding streamed videos in online discussion forums?

This paper attempts to answer both questions in order to offer some guidelines when introducing streamed videos in online discussion forums. In order to do so, the paper carries out an empirical study on a distance Management Accounting course, for which a set of videos was created in order to answer the most complex of the students' questions. We gathered 79 student comments about how to improve online discussion forums during the course and carried out a questionnaire at the end of the course (see Annex). The analysis followed an approach based on the work of Breen, Linsay, Jenkins and Smith (2001) for evaluating technological tools in university learning environments, and Dringus and Ellis's (2005) proposal based on seven indicators for assessing students' progress in online discussion forums. Finally, the paper draws some conclusions regarding the embedding of videos for providing students feedback in online discussion forums on distance courses, especially in Management Accounting courses.

## 2 LITERATURE REVIEW

The effectiveness of learning processes on distance courses depends mainly on the quality of educational materials and of communication between students, as well as between students and teachers (Patriarcheas & Xenos, 2009). For this reason, feedback is one of the key elements (Hounsell, 2003) in improving the learning process, since learners perform more effectively when they know what needs to be improved, and when they have a clear idea about the task they are doing. This fact is highlighted when learning processes take place on distance courses, where there is discontinuous face-to-face contact.

### 2.1 Feedback In Distance Learning Environment

Feedback is defined as information about the gap between a learner's performance level and the reference level, which is used by the student to narrow that gap (Ramprasad, 1983). Hounsell (2003, p. 67) noted that 'it has long been recognized, by researchers and practitioners alike, that feedback plays a decisive role in learning and development, within and beyond formal educational settings'. However, this concept has been relatively under-explored and under-researched (Carless, 2006). Gibbs and Simpson (2004) noted that feedback must also be understandable, timely and acted upon by students in order to improve their work and learning. Orsmond, Merry and Reiling (2005) asserted that feedback affects students' progress by enhancing their motivation, learning, reflection and understanding.

Carless (2006) asserted that students are often dissatisfied with the feedback they receive from their teachers because they hope to receive specific advice to improve their results, they are unable or have difficulties in understanding and interpreting the comments and they sometimes receive feedback that has a potentially negative impact on their self-perception and confidence.

The creation of distance learning programs brought about new problems and opportunities associated with feedback. However, Denton, Madden, Roberts and Rowe (2008) argued that the criteria for effective feedback remain unchanged. Ravenscroft and Mathesons (2001) suggested that educational dialogue on attended courses is a key element in the learning process, since it offers rich and speedy feedback to both teachers and students. However, this dialogue does not naturally arise on distance courses. According to Ravenscroft and Matheson (2001), on distance courses, teachers must transfer traditional educational dialogue to new forms of communication using existing online tools. In other words, teachers must offer new ways to provide efficient communication and feedback. Along these lines, Ravenscroft and Matheson (2001) suggested that online discussion forums are tools that are perfectly capable of supporting educational dialogue on distance courses and to offer the level of feedback required.

### 2.2 Online Discussion Forums In Distance Learning Environment

The use of web-based technology in education has been increasing over the last decades, more specifically in distance learning environments (Yung, 2004). Traditionally, the primary tool used to provide students with feedback on distance learning courses has been electronic mail (Biesenbach-Lucas, 2005). However, other web-based tools have taken an increasingly important role in the learning process. Among them, Patriarcheas and

Xenos (2009) commented that the use of discussion forums on distance courses has been increasing continuously, becoming an essential part of the learning process for students. An online forum is an Internet discussion site, which is the modern equivalent of a traditional bulletin board, and a technological evolution of the dialup bulletin board system. The contributions in a forum are presented by levels. The first contribution in a forum is situated in the first level. The direct contributions to the first one are classified as second level contributions; the direct contributions to the second ones are classified as third level contributions, and so on. So, a forum has as many contribution levels as their participants need, thus making the comments a tree structure. From the first research about the use of online forums in the field of education (e.g. Klemm, 1997), many researchers have studied their usefulness in distance education, e.g. Dringus and Ellis (2005), Patel and Aghayere (2006), Dengler (2008), and Patriarcheas and Xenos (2009).

Patel and Aghayere (2006) proposed that online discussion forums improve and promote active learning, placing students in the centre of the learning process. In line with comments by Ravenscroft and Matheson (2001), Dengler (2008) observed that online discussion forums allow for a more pleasant educational dialogue especially for certain groups (e.g. non-native English speakers and shy students) since they offer a greater sensation of security which is translated into a greater degree of participation and interaction. Another notable characteristic in the use of discussion forums is the relatively small workload for lecturers in comparison to other media such as chatting, videoconferencing or even email. Online discussion forums allow students to answer the questions of their classmates, to receive quicker answers, and allow lecturers to avoid answering the same questions as many times as students ask them by e-mail or by telephone.

Valuing of the usefulness of online discussion forums as well as the evaluation of students' participation are areas that have been dealt with diversely, which is reflected in the existing literature. Work by Dringus and Ellis (2005) on the valuation of online discussion forums has included and unified the results of previous investigations in the field. Dringus and Ellis (2005) proposed an enhanced assessment of student progress in online discussion forums based on seven indicators from nineteen common participation indicators used to assess student progress in online discussion forums. The results of work by Lewinson (2005) on the use and efficiency of online discussion forums suggested that they could vary with respect to several items such as institutional models and instructions, nevertheless their structure and function do not vary in relation to these models.

Soong, Chan, Chua and Loh (2001) suggested that the factors for success of online discussion forums, as well as the other online resources, are: human factors pertaining to the instructors; the instructors' and students' technical competency; the instructors' and students' mind-set (about learning); the level of collaboration intrinsic in the course; and the level of perceived IT infrastructure and technical support. Several of these factors make direct reference to the adaptation of educational dialogue and consequently to feedback from online discussion forums (e.g. the level of collaboration intrinsic to the course). Similar to the results of work by Soong et al. (2001), Mazzolini and Maddison (2003) suggested that the type of participation by teachers on an online discussion forum influences the participation of students and its overall effectiveness, although not always of the expected way. With this in mind, the inclusion of self-made videos in online discussion forums to clear up doubts, clarify concepts and to raise new questions could consequently provide unexpected results in educational dialogue and in the usefulness and efficiency of feedback in the students' learning processes. A great amount of literature exists in particular on the use of videos in the educational field and on distance courses, while only minimum attention has been paid to the use of videos in online discussion forums.

### 2.3 Video In Higher Education

During the 20th century, video became a well-known medium for communication, business, entertainment and learning. In this last field, many researchers have recognized the usefulness of video in students' learning processes; however, there are many other benefits video provides that have not been explored to date in higher education. Caspi, Gorsky and Privman (2005) suggested that videos could be divided into three categories according to their use: demonstration, narrative, and recorded lectures. Demonstrational video provides a tool for viewing procedures that are not available verbally in other ways and recording students' performance for feedback purposes. The use of this kind of video offers various benefits to both teachers and students: they help teachers achieve a better explanation and provide students with better visualization, recognition and identification. According to Caspi et al. (2005), there are some factors that must be taken into consideration for creating a useful demonstrational video, e.g. narration and pace.

The appearance of digital video has added a new dimension to video-based learning. The rapid development of new technologies and the decrease in the cost of producing digital videos have allowed teachers to record, edit and produce their own videos in minimum time. In recent years, a new kind of technology, streamed video, has garnered great interest in education, but despite this, the existing literature has devoted relatively little empirical and theoretical research to this technological tool. According to Shephard (2003), a streamed video is “a video that has been ‘streamed’ over the Internet to users who request it, for example, by clicking on a hyperlink within a web page”. Fill and Ottewill (2006) suggested that the streamed video plays two important roles in higher education, as it constitutes (1) a learning tool or resource to be ‘pulled’ by the students and (2) a distribution procedure ‘pushed’ by the teachers.

Streamed video has various advantages in higher education (Fill & Ottewill, 2006) including: increased students’ access and control on the video; the possibility of splitting the video content into smaller sections for allowing students a faster access; incorporating it into other multimedia learning resources; speeding up processes that need more time and resources in the learning processes; changes to a single copy instantly available to all, which makes it cheap and easy to update; and changing the perceptions of students. Moreover, Marx and Frost (1998) suggested that video could be a powerful motivator and context setter for student learning. The incorporation of streamed video into other multimedia learning resources, such as an online discussion forum (multimedia learning resources), has not been completely developed, and there are still few empirical studies focusing on their impact upon the learning process of students. However, in the last years some companies, e.g. Voicethread.com, have developed tools and services that provide the infrastructure to create online discussion forums that integrate text, video and audio seamlessly. From these platforms, some studies have been developed in order to analyse them. Borup, Graham and Velasquez (2011) share their experiences with using asynchronous video communications to increase teacher immediacy and social presence during a technology integration course for pre-service teachers. In a similar way, Brunvand and Byrd (2011) also present a study where they introduce the services of VoiceThread to promote learning engagement. These studies suggest the use of video instructor-student can be an effective way to improve instructor immediacy and social presence. However, the majority of the literature shows that most of research in this field refers only to online text-based discussion forums, or the use of videos without considering them as a part of the text in the online discussion forums.

The use of streamed video in accounting courses is common in the literature, and have received extensive coverage by the research community (e.g. Dunbar, 2004; Hornik & Thornburg, 2010; Apostolou, Hassell, Rebele & Watson, 2010; Rich, 2012; and Fessler, 2012). However, these papers have focused on the characteristics of the video and/or the processes of their creation more than the effects of the interaction of embedded videos and text. We believe that this relationship is essential in order to have an appropriate educational dialogue between students and lecturers.

### 3 METHODOLOGY

The research consists of an empirical study on an on-line Management Accounting course during the second semester of 2008, where we introduced a set of streamed demonstrational videos on the online discussion forums in order to provide feedback to the students (educational dialogue), answering the most complex of students’ questions and introducing some key concepts (also by student request). In order to analyse the feedback in this context, we gathered the students’ feelings, perceptions, reactions, and suggestions about the use of text and streamed videos into the same online discussion forum, through a second permanent online forum (whose main objective was to attempt to solve problems related to the general course work and not to the content of the course), emails and a questionnaire conducted at the end of the course. From the gathered data, this paper analyses the use of text and streamed video in online discussion forums from two points of view: on one hand, we evaluated their features following the proposal of Breen et al. (2001). Although there are many proposals and tools for evaluating online teaching resources, this one is able to analyse the embedding of streamed videos on text in online discussion forums from a wide range of perspectives. Moreover, many researchers have followed this proposal to analyse online teaching resources (e.g. Fernandez, Simo & Sallan, 2009), so it allows us to compare and discuss the results of this research with other similar findings in the literature, e.g. podcasting. On the other hand, we assessed student progress in online discussion forums based on Dringus and Ellis (2005)’s seven indicators: degree of presence in forum, lurking, level of interaction in forum, transitions, extent of instructor interaction, timing and pace, and shared resources. The work of Dringus and Ellis (2005) is one of the most popular and cited papers related to the assessment of asynchronous

discussion forums, because of its detailed literature review on discussion forums, and the final proposal for its assessment. Meanwhile, the Breen et al. (2001) proposal allows us to analyse the features of the online discussion forum with streamed videos and to compare it with others on-line tools (outward), Dringus and Ellis (2005)'s seven indicators allows us to study the more specific features of on-line discussion forums (inward).

### 3.1 Context Of Empirical Study

'Introduction to Management Accounting' was a compulsory subject worth 4.5 credits (a 45 class hours workload) taken during the second year of a Business Studies degree (equivalent to Master degree). This course was offered by the Open University of Catalonia, an online distance university whose educational model was aimed at "facilitating students' access to learning resources from any place at any time, in a way that permits education to be integrated in people's lives". The main tool of communication among students and lecturers in the degree program are the on-line discussion forums, because it's a way to discover and learn new knowledge working as a group where students have different calendars and timetables (asynchronous learning). There are other resources (e.g. phone call dialog or on-line conferences), but none of them allow students and teachers to work together (as a group) in an asynchronous way as the online discussion forums.

The course, like the rest of courses of the degree program, has five main parts: The self-studying text material (mainly in paper-based or web-based format), the on-line discussion forums (where one of them is used as lecturers' bulletin board), five continuous and individual assessment tests (known as PAC), one individual final test, and supplementary external teaching materials (external links to other resources, such as web-sites, books, and streamed videos – mainly from YouTube). So, the use of videos in the majority of courses is a complementary tool for those students who want to go further in a topic, but it is never one of the main resources of the course. The operation of the course is very simple: at the beginning of every week, lecturers introduce the text material to study and the following continuous assessment test through a specific forum (lecturers' bulletin board). After reading the material, students can start to ask questions about the text material or the continuous assessment test through the on-line discussion forums. Students usually respond to most questions of their classmates under the supervision of lecturers. The remaining questions are answered directly by the course instructors. The online text-based discussion forums are the most important resources to achieve an efficient learning process in the degree program. A discussion forum in this course generates about sixty interventions by students in a week. The annual reviews show that students access discussion forums about 4 times a week, either for queries or to review the comments of other classmates and teachers. So we could consider that the discussion forums are the most important tool for the student learning process, jointly with the text material (hand-book) of the course. Students use of the online discussion forum for rapid communication on issues related to the theory and exercises of the course with the participation of all students and teachers, while email is used for communicating personal matters. However, the teachers of the course had detected that these tools (on-line discussion forums) did not generate educational dialogue and the required feedback for a large number of students.

Many students had expressed their worries about the limitations of email and online discussion forums in providing efficient feedback during previous editions of the course. According to the students, text-based feedback is not enough to solve their doubts on those subjects focused on processes. With reference to this, Inglis (1998) suggested that tools based on text are not able to give efficient feedback in some knowledge fields. To deal with this problem, the coordinators decided to introduce streamed videos in combination with text in the online discussion forum of the course, in order to enhance educational dialogue and the feedback between students and teachers. Conole and Fill (2005) observed that several media can be combined to produce better results. In this research, we analysed the usefulness of enhanced forums where text and streamed videos take place together in an online discussion forum. More specifically, the video player was embedded within the online discussion forum in order not to break the response thread.

### 3.2 The Videos Of The Course

In order to create videos, the teachers of the course looked for software with two criteria in mind: the software used should be economic, available to all the teachers and easy to use to reduce production time. After comparing several different software packages, two programs were chosen: Copernicus (by Danicsoft), to capture images and screen images, and iLife'08 (by Apple Inc.) to edit videos. The use of this software enabled the creation of two to five minute long videos in only twenty minutes. Other new and better tools can be found

in order to create educational videos. Screen Recorder, CamStudio, Jing, Wink and ultraVNC are popular examples of software to capture images and record screens. On the other hand, iLife'11, Video Editor, Adobe Premiere 11 Elements, Movie Maker and Final Cut Express are some of the most popular video editing software in the market.

Three different kinds of videos were developed throughout the course: (a) an introductory video, where the lecturers introduced the on-line resources of the course in the intranet and resolved some doubts about how to use the online resources of the intranet (this video was added to the lecturers' bulletin board, but we decided not to analyse it because it was beyond of the scope of the research); (b) theoretical videos, where the lecturers answered the students' most important questions related to the concepts of the course through screen recording; and (c) practical videos, where the lecturers attempted to solve the students' doubts about exercises and procedures through screen recordings. The last two were developed according to the type of questions and comments that had appeared in the online discussion forum. We only created and embedded in the online discussion forum those videos that allowed us to reduce the time needed to explain and answer the students' questions and doubts. The time required to create the videos was a critical element, because students expected a quick answer or comment from lecturers.

As we have indicated, lecturers developed and embedded videos in the discussion forums in order to answer some student questions during the course. At the end of the term, these videos were added in the FAQ of the course. The strategy was that lecturers could answer the most complex questions by embedding videos in the on-line discussion forums, taking them from FAQ or creating new ones depending on the type of question. The lecturers of the course attempted to update the content and the exercises of the course with current examples from the business world. In the same vein, the continuous and individual assessment tests are different for every course.

So, it's reasonable to assume that each year the teachers have to develop some new videos for certain questions (but not so many as in the first courses). Here, it is important to emphasize the need to embed the videos (new and old videos) in the discussion forums to improve the thread of the response.

According to the comments of students and lecturers, questions such as: "What is the difference between a variable cost and fixed cost?", "What is the difference between a direct and an indirect cost?" or "How do you calculate the industrial margin in a full-cost model?" were examples of questions which were better answered through text rather than educational videos. However, students had many difficulties to calculate some parts in complex problems and exercises where there more complex issues of cost accounting, such as presence of mutual benefits, on-going production and sub-activities costs.

The explanation, step by step, of their calculation on a spreadsheet improved the comprehension of students, but it was complex to write them in a text. For this reason, many of the videos of the course were screen recordings of spreadsheets, answering the questions related to how to calculate some parts of exercises or problems.

Another example was an explanation about the differences between Direct-Cost and Full-Cost models in a specific exercise. Some reflections on the use of one model or another in that exercise were difficult to express in a written document. For this reason lecturers had to develop a specific video discussing this election with simple real examples (e.g. a library).

### 3.3 Measurement

Educational evaluation is a complex topic, even with simple learning resources (Shephard, 2003). For this reason, we gathered information from primary sources, such as an online discussion forum, e-mails and a questionnaire at the end of the course, in order to analyse the features of the use of streamed videos and text into the same online discussion forum and the students' progress in this kind of resource. With respect to the gathered data, we received from students many suggestions on how to improve the presentation and contents of the videos during the course, e.g. narration and pace, through e-mails and a specific forum of the intranet to gather this kind of information. At the end of the course, all these emails and messages from the intranet were coded, ordered, and classify in several categories according to the assessment tools proposed by Dringus and Ellis (2005), and Soong et al. (2001). We also designed a 5-Likert scale questionnaire based on work by Breen et al. (2001), which offered an approach for evaluating technological tools in university

learning environments, in order to evaluate the features of the use of streamed videos and text in the same online discussion forum. We ruled out three of Breen et al. (2001) features (accessibility convenience, consolidation convenience, and cost), as they did not fit with the type of technological tool that we were analysing.

## 4 RESULTS AND DISCUSSION

The course was taken by 79 students (47.91% men and 52.09% women). According to the questionnaire, 88.6% of students were working and studying in the degree program simultaneously; and 94.9% of them had family responsibilities that require an important weekly time (children, parents, etc.). All of them were [COUNTRY] and had previously obtained a university degree (3-year) related to business management or economics. 61.72% of the students followed the continuous assessment and used online discussion forums, although only 46.91% students (22 men and 16 women, with an average age of 30.21) answered the final questionnaire. Students also offered suggestions and comments on their experience during the course through diverse media (emails and a specific forum to add messages related to the use of videos). The questionnaire results revealed that 4.21% students had already had experiences with different types of educational videos as one of the main resources of the course. According to students, lecturers of other courses had proposed the viewing of some streamed videos (mainly in YouTube) as complementary teaching material in the syllabus of the course; however, the viewing of these videos was optional, and their lecturers have never developed them. On the other hand, none of them had experience with the use of embedded videos in other online resources; only as independent videos (external links) of the complementary teaching material of the course.

In the first section of the questionnaire, students gave an overall assessment of the usefulness of including every kind of video in the online discussion forums. The results show that the cases with practical videos were considered the most useful with a final score of 4.48 out of 5. Furthermore, students also asserted the inclusion of theoretical videos in the online discussion forums as very useful, with an overall assessment of 4.15. Finally, the discussion about introductory videos was considered the least useful although it achieved a high assessment (4.01) as well.

### 4.1 Features Of The Use Of Streamed Videos And Text Into The Online Discussion Forum

The list of features proposed by Breen et al. (2001) can be distributed in different categories. The first set of features (see Table 1) refers to the usefulness of embedding streamed videos on online discussion forums. According to the results, the 'Specificity' and 'Currency' features obtained a medium-high score (3.5 and 3.19 respectively). The lecturers expected these results, as the main purpose of these videos was to answer specific doubts and questions that had appeared from the core didactic materials and resources of the course, and not to replace them. The 'Failure' and 'Serendipity' features highlighted more interesting aspects for the objectives of this research. The opinions collected from students for the 'Failure' feature was 1.31, a very low score, which reflects that the inclusion of videos in online discussion forums did not cause any damaging effect upon the students' learning process. This feature is very important because a low score is a necessary condition to consider this kind of solution acceptable in education. Nevertheless, some students wanted to emphasize, by email and by the specific forum to assess the videos, that certain videos were not necessary and that they obstructed the learning process more than helping it because the answer that could have been provided by one or two written commentaries. At the same time, several students emphasized, as a main disadvantage, that the multimedia materials did not allow them to obtain an overall vision of the answer in a quick and simple way. For example, the students could grasp the thread of the argument and the answer by only reading a reduced set of phrases on the text based online discussion forum. On the other hand, students were incapable of obtaining the overall vision of the online discussion forum without a complete visualization of the videos included. For instance, a student said: "to understand some answers, it is necessary to watch all the previous videos, and some times you need much time for doing it. With text comments, it would be faster". This fact limited them when selecting which conversations they wished to follow in the online discussion forums. These results agree with those obtained with the use of podcasting (Fernandez et al, 2009) in higher education. With regard to the 'Serendipity' feature, we obtained a high score (4.19), which was consistent with many comments that students had made to us during the course. They expressed their satisfaction for having understood some specific concepts, which would have been difficult to assimilate otherwise, through the core didactic materials of the course (especially the paper-based documents) or by

online text-based discussion forums. This result agrees with the analysis of Mazzolini and Maddison (2003) where they suggested the type of participation by teachers in an online discussion forum influences its effectiveness, although not always in the expected way.

<b>Features</b>	<b>Definitions</b>
<i>Specificity</i>	<i>Belief or judgement that online discussion forums, which combine text with streamed videos, provide results of direct relevance to the learning process accompanied by little irrelevant information</i>
<i>Serendipity</i>	<i>Belief or judgement that accidental discovery occurs when online discussion forums, which combine text with streamed videos, are used</i>
<i>Currency</i>	<i>Belief or judgement that online discussion forums, which combine text with streamed videos, produce up-to-date results</i>
<i>Failure</i>	<i>Belief or judgement that learning is impaired by malfunction of online discussion forums, which combine text with streamed videos</i>

Table 1. First set of features and their definitions

The second set of features (see Figure 1) refers to the facilities and restrictions of the use of streamed video in online discussion forums. According to students, the use of this kind of forum did not require specific skills to use them (the value of the ‘Preparedness’ feature was 1.44); therefore, the combination of text and videos provided another advantage, by eliminating the need for preparing or training students in their use for educational purposes. Another feature of the use of videos is ‘Competition for access’, which is also another necessary condition for considering the embedded of videos as a useful tool in education. The result (1.84) suggested that the use of this kind of video in online discussion forums did not disadvantage other learners. Finally, we observed that the score of the ‘Efficiency’ feature was medium-high (3.78), which was in line with the results of the previous features. The overall result of the ‘Information overload’ feature showed that the embedding of videos in the online discussion forums did not increase the quantity of resources to learn in an unnecessary way. In fact, the inclusion of videos allowed for a significant reduction in the number of messages in the online discussion forum since students more easily assimilated the lecturers’ answers and it was not necessary to clarify details with further postings. As the ‘Failure’ and the ‘Competition for access’ features, the ‘Information overload’ feature is a necessary condition, which students assessed it with a score of 2.0.

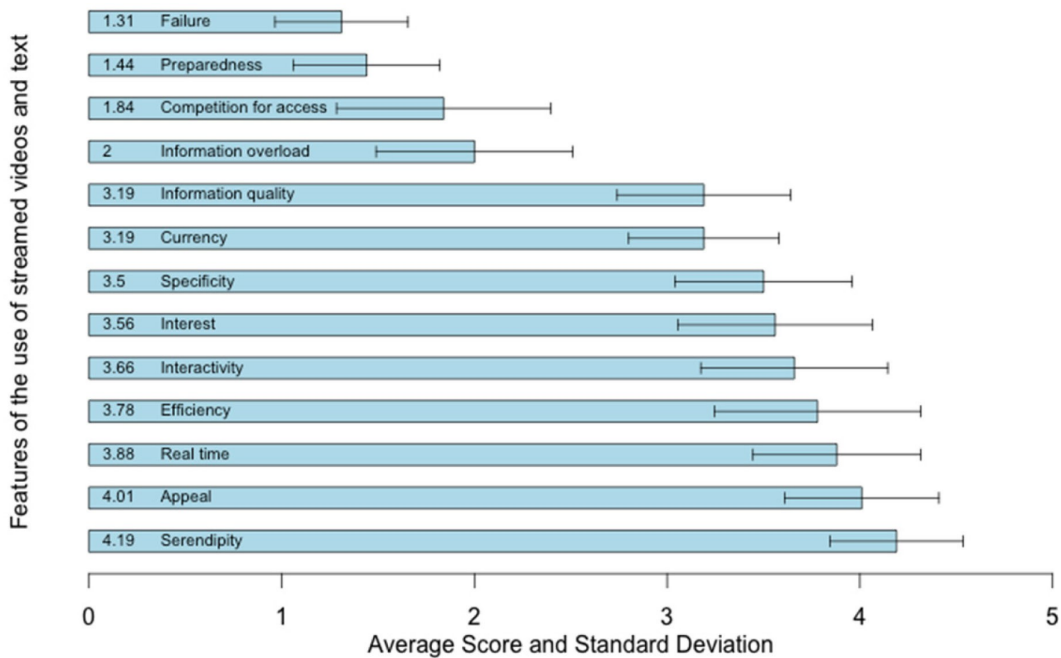


Figure 1. Second set of features and their definitions



The third set of features (see Table 2) makes reference to students' stimulating aspects. The 'Interest' and the 'Interactivity' features had medium-high scores (3.56 and 3.66 respectively). These results were consistent with many comments that the lecturers received from students, who noted that the inclusion of videos was motivating. According to the students, the time that the lecturers spent creating and editing videos to answer their questions reflected the lecturers' concern, interest and desire to help them and support their learning. Some students' comments concerning their enhanced motivation were: "It is nice to know that there are people behind the intranet interested in our learning process", "I have felt teachers closer than in any other courses" and "One of the most important features of the videos has been the feeling of proximity between teachers and students". The last feature of this set is 'Appeal', which scored 4.01. According to the students, the use of the videos was intrinsically very pleasurable, enhancing their motivation, which determined a growing number of students to keep using the online discussion forums compared to previous courses. Fernandez et al. (2009) suggested the use of podcasting also provided an increase in students' motivation because the use of a new technology usually brings an increase in motivation and students also perceive such work as showing a greater involvement by part of the teachers towards the students.

<b>Features</b>	<b>Definitions</b>
<i>Interest</i>	<i>Belief or judgement that intellectual stimulation results from using online discussion forums, which combine text with streamed videos</i>
<i>Interactivity</i>	<i>Belief or judgement that online discussion forums, which combine text with streamed videos, respond to characteristics of a user or query</i>
<i>Appeal</i>	<i>Belief or judgement that the use of online discussion forums, which combine text with streamed videos, is intrinsically pleasurable</i>

*Table 2. Third set of features and their definitions*

Finally, there is another set of features (see Table 3) that concerns the quality of the content of the streamed videos. The 'Information quality' and the 'Real time' features obtained medium scores (3.19 and 2.88, respectively). However, the score of 'Real time' feature was not surprising, as the goal of the inclusion of the videos in the online discussion forums was only to give feedback to students' specific questions more than to create pre-established videos encompassing the whole theory and the exercises.

<b>Features</b>	<b>Definitions</b>
<i>Information quality</i>	<i>Belief or judgement that online discussion forums, which combine text with streamed videos, produce results that are valid</i>
<i>Real time</i>	<i>Belief or judgement that the information about a learning domain captured by online discussion forums, which combine text with streamed videos, is complete</i>

*Table 3. Fourth set of features and their definitions*

The Table 4 shows a summary of the quantitative results (mean and standard deviations) of the questionnaire for each feature proposed by Breen et al. (2001) at the end of the course.

<b>Features</b>	<b>Questionnaire (N=32)</b>
<i>Specificity</i>	3.50 (0.92)
<i>Efficiency</i>	3.78 (1.07)
<i>Interest</i>	3.56 (1.01)
<i>Serendipity</i>	4.19 (0.69)
<i>Interactivity</i>	3.66 (0.97)
<i>Currency</i>	3.19 (0.78)
<i>Information overload</i>	2.00 (1.02)
<i>Information quality</i>	3.19 (0.90)
<i>Failure</i>	1.31 (0.69)
<i>Preparedness</i>	1.44 (0.76)
<i>Competition for access</i>	1.84 (1.11)
<i>Real time</i>	3.88 (0.87)
<i>Appeal</i>	4.01 (0.80)

Table 4. Results of the questionnaire at the end of the course

#### 4.2 Assessment Of Student Progress In Online Discussion Forums

From the Dringus and Ellis (2005)'s proposal for assessing of student progress in online discussion forums, we analysed both teachers' and students' participation throughout the course. The degree of presence in the online discussion forums as well as "lurking" fell noticeably (approx. 25% from the previous two courses). This fact would be worrisome if it were not for the increased following of the online discussion forums for the subject and the decrease in the number of contributions of level 4, 5, etc. As was observed in previous sections, the majority of contributions at level 4 were due to the fact that students were not able to completely understand the answers offered at higher levels, meaning that they asked again about part of the given answer. After introducing streamed videos among the text in the online discussion forums, the number of these types of questions fell; however, students continued making complementary questions to the first level questions as a consequence of explanation given. The fact of introducing videos in the online discussion forums also led to an increase in the indicator "timing and pace", because the answer offered by the teachers required more preparation time: the time to prepare a video and a coherent insertion in an online discussion forum meant a greater amount of work. On the other hand, the average time between opening and closing a discussion significantly diminished due to the reduction in contributions of level 4, 5, etc. Several teachers indicated that the work undertaking in creating and inserting the videos in the online discussion forums had a beneficial effect in two ways: firstly, the number of postings in the online discussion forums was significantly reduced from level 4 (a reduction of 80% from the previous two courses), and that the number of open discussions was smaller, making it easier to organize the online discussion forum (a reduction of 30% from the previous two courses). Generally, the teachers appreciated the embedding of streamed videos in the discussion forums since it reduced the number of interventions they had to undertake. According to the teachers of the subject, the selection of software was essential in order to reduce learning time and time to create videos. These results agreed with two of the factors for success of online discussion forums according to Soong et al. (2001): the instructors' and students' mindset and the level of collaboration intrinsic in the course.

Although the majority of comments and evaluations by teachers and students and gathered by emails and the specific forum for commenting on the videos were positive, some students observations raised three significant limitations of the tool: Firstly, some students noted that they had not followed the discussions in the online discussion forums because they would have rather studied with paper-based resources (such as books and photocopies) than with technological resources (electronic files, videos, etc.). According to Conner, Wright, De Vries, Curry, Zeider, Wilmsmeyer, et al. (1996), students are different in terms of their learning skills, and teachers must be aware of these differences. In that sense, there are different types of learners (1) visual learners, (2) auditory learners, (3) kinaesthetic learners, and (4) tactile learners. Another limitation related to the embedding of videos in online discussion forums was the lack of time for studying. As mentioned previously, following a discussion with embedded videos required an increase in time and effort for students, as they have to watch it all in order to know its exact content. Whereas a student can understand a written text in a reduced time (it is not necessary to read all sentences in order to do so), the speed of a video is constant and it is not known what has been said exactly until it has finished. In order to reduce this effect, the teachers of the

subject began to complement the insertion of videos with written comments before and after the video with mixed results. Finally, the majority of students pointed out that the embedding of videos in online discussion forums should only be undertaken in situations where a simpler explanation could lead to confusion. Generally, students preferred written answers since they were faster to read. We must take this fact into account since the indiscriminate use of videos in online discussion forums requires a greater effort on the part of students who are following a number of other subjects at the same time on their courses.

## 5 CONCLUSIONS

The results of this investigation show that the embedding of streamed video in the text explanations in online discussion forums on distance courses generates the educational dialogue that students need under some conditions that teachers must take into account: Although, initially, teachers consider that the creation and edition of streamed videos for discussion requires a lot of work, the results show that eventually the workload is reduced due to the reduction of queries at the fourth and fifth levels in the forums. Moreover, teachers can have economies of scale in the future through adding the videos to the course FAQ. For these reasons, it is important that the teachers are convinced of their usefulness before starting the course and that they see it as more than an increase in workload. For the same reason, the selection of software as well as teacher training in the creation and editing of videos are key for the future success.

Although most teachers might initially think that students prefer the use of embedded videos instead of only text in online discussions, the results show the opposite. On one hand, students don't like long videos (more than 5 minutes according to their comments) because a video does not offer a global vision of an answer in a quick and simple way, as it has to be watched in its entirety. On the other hand, students do many interventions in online discussion forums, as a consequence the searching tool of the forums is a key tool for finding questions and their answers. The streamed videos are not indexed in the searching tool, so students can't find them easily in the contents of the online discussion forums. For this reason, it is recommended that the inclusion of videos in online discussion forums should be accompanied by text explanations. And finally, the embedding of a video must only be undertaken in those cases where it is required to explain a process in detail or where a written explanation can be confusing. According to students, text answers are easier to read and review for easier questions; meanwhile the complex processes and answers are simpler to follow through videos.

The results of this paper suggest new areas of research related to videos and online forums discussion such as the effect of their duration, the creation of predefined videos and the areas of knowledge in which to use them. We encourage teachers to continue to embed new multimedia tools in the online forums of discussion with the aim of improving feedback and the students' learning process.

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**Citation:** Fernandez, V., Simo, P., Castillo-Merino, D., & Sallan, J.M. (2014). Online discussion forums with embedded streamed videos on distance courses. *Journal of Technology and Science Education (JOTSE)*, 4(1), 25-38. <http://dx.doi.org/10.3926/jotse.91>

On-line ISSN: 2013-6374 – Print ISSN: 2014-5349 – DL: B-2000-2012

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Published by OmniaScience ([www.omniascience.com](http://www.omniascience.com))



Journal of Technology and Science Education, 2014 ([www.jotse.org](http://www.jotse.org))



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