

Mini-videos use in the teaching of Science and Materials Engineering

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Abstract:

This work has developed a new teaching tool based on the mini videos (short videos) for self-learning of Science and Engineering of Materials by analyzing its didactic functionality. This form of e-learning is based on the philosophy of the professor works, the student works within the paradigm of EHEA. A series of mini videos which cover basic aspects of the Materials Science subject have been based on the teaching experience of application of short videos. In the preparation of the mini videos basic aspects of development are taken into account to achieve the best results of learning by students. In addition, the preliminary results obtained on the utility that has provided this type of tool to third grader student of Chemistry of the University of Jaen are presented. The results highlight how this resource can be useful in classroom as blended learning teaching, as well as the development of generic skills in Science of Materials.

Keywords: short videos, educational video, e-learning, educational innovation.

Resumen

En el presente trabajo se ha desarrollado una nueva herramienta de enseñanza basada en los minivideos (videos de corta duración) para el autoaprendizaje de Ciencia e Ingeniería de los Materiales analizando su funcionalidad didáctica. Esta forma de e-learning se basa en la filosofía del profesor trabaja, el estudiante trabaja y está dentro del paradigma del EEES. A partir de la experiencia docente de aplicación de vídeos de corta duración se han realizado una serie de minivideos que cubren aspectos básicos de la asignatura Ciencia de los Materiales. En la elaboración de los minivideos se han tenido en cuenta aspectos básicos de elaboración para conseguir resultados óptimos de aprendizaje por parte de los estudiantes. Además se presentan los resultados preliminares obtenidos sobre la utilidad que les ha proporcionado este tipo de herramienta a estudiantes de tercer grado de Química de la Universidad de Jaén. Los resultados ponen de manifiesto como este recurso puede ser muy útil en la enseñanza presencial como semipresencial, así como en el desarrollo de competencias genéricas en Ciencia de los Materiales

Palabras clave: mini videos, videos educativos, e-learning, innovación docente.

1.Introduction

In the new paradigm of the European Higher Education Area (EHEA) within the Bologna process, the development of educational proposals and methodological strategies employing various activities which involve a more active role by the students, a greater involvement and autonomy of the students and that students learn, improving their skills [1], while the lecturer acts as a creative agent of motivating learning environments for students. The lecturers should generate resources and facilitate a good context for learning [2], but it is the own student the one that it is learning being the main factor for learning is the willing of learning and the effort to achieve it [3, 4]. It is clear that the students are the key part in this process. However, the lecturer can and must help him/her, facilitating and guiding his/her autonomous learning. Therefore, the lecturer should get the world of teaching students to learn, it is to contribute to developing their freedom and, in part, to bring her happiness working or researching to offer an improvement in the quality of life of this society.this point of view, it is easy to understand that lecturers

must be committed to the goal of continuous improvement in the quality of teaching. The lecturer should generate resources and promote a good context for learning, but that it is the student who is learning. Indeed, Behar and Grima [4] agreed that the main determinant of learning is the willingness to learn and the effort to get it. No one can turn on for us!. It is clear that the student is key in the process of learning. However, the lecturers can and should help them in this process, facilitating and guiding their autonomous learning.

The main methods of transmission of knowledge in current teaching are traditional slate, transparencies (slides) and videos of complete classes [5]. At present it is not clear what is the best method of transmission of knowledge by the lecturer. It passed the slide to transparencies in a short space of time, without be able to assimilate well the advantages and disadvantages of these. All of the new multimedia technologies in terms of class videos complete they have burst on stage, also with its advantages and disadvantages. Strong slate points are that it is more dynamic, it is easier to take notes, professor explained it (turning more examples), it is easier to follow him/her by the pace and speed that gives explanations and there is greater interactivity. The weak points are that: slows down a little class, it is more difficult for the lecturer to be ordained, often do not have a "clean" finish, is difficult to copy and understand at the same time and the quality of the drawings is worse. The advantages of the slides are that they are faster and more orderly, no copy, have a "clean" finish, there are possibility of graphic and multimedia support and can be easily accessible on the web. The disadvantages are that they are sometimes too fast, favor a passive attitude, are often too short, explanations tend to be more succinct and there is space for taking notes. The fundamental importance of full class videos is that: they inherit advantages of transparencies, allow the possibility of blended and not required by the professor of extra preparation. Against its disadvantages are that they inherit the disadvantages of transparencies, tend to be very long and is tired to see them on the screen and it is difficult to manage in terms of size from the computer point of view and to search content in them. Recently, it have been introduced the concepts of teaching mini-video, for educational purposes, trying to combine the best of the previous methods and eliminate the worst. This concept of teaching mini-video was introduced by Letón et al. [5] where applied to a

subject of basic statistics, within the scope of the University classroom. The mini video is characterized by a few concrete elements in terms of duration, support, methodology and format [6]. It has several and relevant advantages for the lecturer and for the student. The self learning mini videos are the natural evolution of the recording of the lectures, although with a radically different characteristic: the short length (5-10 minutes); therefore they can be easily handled in Internet and can be reproduced in any portable multimedia player or shared through bluetooth. Therefore, the mini videos constitute a teaching material of a technical to transmit specific information that will help to consolidate some learning. Its educational purpose is to reinforce the learning process those concepts, along experience as lecturers, have been detected those who present more difficulties in their understanding and assimilation by the students. The main advantages for the student are they can choose the time, the place and the rhythm of learning. They can re-enter in the subject whenever they wants. There is a real possibility of distance learning. In the field of Science and Engineering of materials has bet on record some mini videos to help students improve learning some more complicated concepts and, on the other hand, to reduce the rate of failure in this discipline. This paper examines the use of multimedia in teaching and learning processes, mini videos for the development of Materials Science lectures for students of the third year of the Degree in Chemistry as a tool at the service of education and learning and didactic orientation that has been given this experience. It has evaluated the impact of the mini videos by means of a survey of assessment by students

1. Method of research

This can be set to mini video as a video of short duration which constitutes a teaching material of a technical to transmit specific information that will help to consolidate some learning [7]. There are several research papers dedicated to analysis of the phases have to observe in the process of preparation of a video for teaching and learning. Thus, Martínez [8], points to the design as the first phase in the development of a video, establishing

the contents and the relationship between them, their sequencing and presentation. The second phase is the production, in which materializes the design using the resources and appropriate technical expertise. Prior to these two phases, there will be held a phase of diagnosis of the problem to be treated and which would justify the subsequent actions. Other authors, as Cabero et al. [9] considered three phases: design, production and post-production and evaluation. All of them dealt with well differentiated stages and each one of them different communicative and educational variables are taken into account.

The mini videos have been developed considering the following aspects:

Selection de content or themes to explain, those which are themes basics or have been identified as most difficult of understood by students.

Preparation of a script and development of the necessary slides. The script processing begins with the preparation of a synopsis containing objectives of mini video and content to develop in the same. In this phase it is important to consider some general guidelines on teaching character, along the lines indicated by Pascual [10]. The duration should be no longer than 10 minutes, because several studies such as the Ellis and Childs [11], show that students lose much de interest from exceeding 10 minutes durations. It is very convenient to introduce both symbolic and narrative elements and use of graphics as a teaching resource. In addition, it is necessary that at the end of the mini video has a brief summary that summarizing the main ideas treated. The support on which the videos are done are mini slides, prepared in PowerPoint and transferred to pdf format. The slides used in the mini videos should be based on a simple philosophy, which could be described as minimalist, which suggests the subsequent explanation that will be developed through a phrase, a chart or an equation.

- Test the presentation.

- Determination of the technical means to be used. Although developing a mini-video can do with a few slides and a simple video camera, this experience has also involved the audiovisual art technology that has developed through the University of Jaen called classroom teaching advanced

- This media resource is available on-line in <http://tv.ujaen.es> or in the platform of virtual teaching ILIAS of the University of Jaen.

Identification of samples.

To achieve the optimal usage of this means learning possibilities arise of utilization strategy based on recommendations of Cabero et al. [9].

Before viewing: the video it contextualizes the corresponding chapter of the agenda, explaining why focusing on one or other concept and objectives pursued. A battery of questions that must be answered by the students after viewing the mini video are also planned.

During the viewing: the lecturer could in the classroom, use the instrumental possibilities of the video (pause, fast forward, reverse,...) for educational interventions. These possibilities are not neglected in distance education but the role of the lecturer turns slightly through an asynchronous virtual intervention.

After the viewing: the final activities listed in the first stage should target central contrast quality and quantity de the information provided, as well as deepening it through de different works, discussion group via forums, search of examples in a real context, etc.

Although seems indisputable value positive of the use of various multimedia tools in learning of scientific matters, in general, and Materials Science and Engineering, in particular, wanted to contrast this view with the trial of students who have had the opportunity to de access them throughout their study of this subject in academic courses 2013-2014. The selected group has been the Chemistry Degree students who are studying the subject of Materials Science.

Analysis of research and results.

Didactic teaching mini videos utility has been analyzed by a poll. The poll is based on a closed questionnaire with a set of 15 questions related to important issues of teaching jobs mini videos developed and distributed through virtual teaching platform ILIAS of University of Jaen. A survey was distributed to students enrolled in the course Science of Materials of the Chemistry degree. The answers were closed.

The survey is voluntary and not motivated, not encouraged students to its response through any type of gift (no credits, no percentage of the final grade). Of the total enrolled students (43) worked with 25 surveys. The opinion that showed respondents on the mini videos tool can be summarized in the following aspects:

The 84% of respondents visualized the mini videos and the 100 % of students who looked at the mini videos saw them teaching.

The 68 % of students have displayed more than once the mini videos, so the students can fix the concepts and can prepare easily the continuous evaluation.

As for the utility that have provided the students these tools the results are quite satisfactory since almost 80% of respondents rated them as useful or very useful.

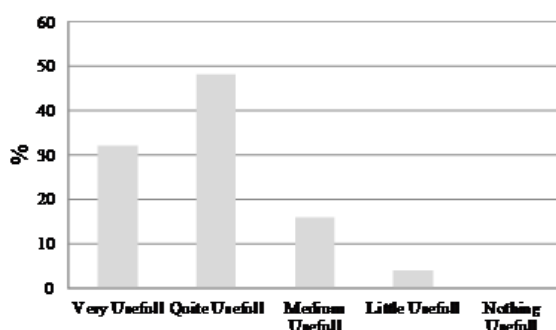


Figure 1. Utility of teaching mini videos in learning of materials Science

A 64% of the surveyed students have allowed the mini videos the assimilation of concepts and continuous monitoring of the developed topics. The mini videos facilitate to follow the subject in a didactic way and at your own rhythm.

A 92% of of students think that the display of the mini videos before class can help you get more out of the classroom.

A 56% of the surveyed students considered that the mini videos give them a lot or some autonomy due to the student can choose the time, place and the rhythm of learning.

A 40% of the surveyed students considered the most appropriate use of mini videos as a complement and reinforcement of concepts of a theme developed in class, a 12% considered its most appropriate use to treat specific issues to that there was no time of treat in class, while 48% considered them adequate both to reinforce

concepts de themes developed in class to treat specific topics not covered in class A 68% of respondents agreed that these tools should be applied not only theoretical concepts but the practical part of the course.

A 60% of the surveyed students have helped the mini videos in the exam preparation.

A 92% of students considered the mini videos a very good tool, which should be extended to the rest of subjects.

Discussion and Conclusions

The success of "learning to learn" embedded in the paradigm of the EHEA both distance learning and classroom will be on whether lecturers and students understand and assume the philosophy: "I work, you work". If both work, this philosophy will succeed, but if one of them will not, fail. This philosophy is part of the educational mini videos and has important advantages for the student and for the lecturer.

The idea behind this form of teaching which incorporates the mini video is that the students can see explanations as many times as they want and wherever they want. In classroom teaching the students will share what they learned, questions and develop a more active interaction with the lecturer.

But it is not worth any video. A technology in which despises is the design and in which communicator talent is conspicuous by its absence will inevitably cause rejection among the recipients. The mini videos should be developed considering:

- Selection de content or themes to explain
- Preparation of a script and development of the necessary slides.
- Test the presentation.
- Determination of the technical means to be used.
- This media resource must be available on-line

Experience in applying these short audio-visual tools in the field of Materials Science has shown the advantages associated with their use. They include, first, to facilitate the assimilation of content that present greater difficulty for the student and, secondly, to make easier the understanding of a sujet which de teaching traditional methods can be quite tedious.

Therefore, it seems that the effort made in the development of mini videos has been positive and the results of surveys conducted among students who used this resource as well confirm it. So 80% of respondents consider the mini videos useful or very useful, and 60% considered that mini videos of practical part of the course practical should record also. However, it is intended to build on this learning experience in the coming years through the extension of the catalog of mini videos and try to assess quantitatively the impact of the use of such means in the final evaluation of theoretical part of the course.

The lecturer has found it a useful tool for students fixed basic concepts and set to meet the planning of the course, because they could spend more time to the resolution problems if used in advance by the student. Thus, the mini videos can be a useful tool for students took advantage of the classroom. Also, the mini videos are a good option for students who are not able to come to class. They facilitate to follow the subject at their own rhythm and when they want. The mini videos are a very good tool, which should be extended to the rest of subjects.

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