EFFECTIVENESS OF VIDEO LECTURING IN ICT LEARNING

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ABSTRACT

The main emphasis of the paper is in the implementation of video lectures, and the analysis of the learning results through video lectures. Also, the influence of using video lectures in teaching is evaluated by comparing the learning of student groups with and without the possibility of using video lectures. Modern technology has had significant effects on learning styles and strategies. For example, young students have learned to search and process data from the Internet through the video sharing services. By using a pre-recorded, interactive video lecture as work instructions for the students it is possible to support different types of learners better. Instead of lecturing, the lecturer is released to support the students in their personal workflow and knowledge construction process as needed. The effectiveness of video lecturing was studied by comparing the average exam points acquired by the different student groups. The sample consisted of first-year students at Lahti University of Applied Sciences in Finland. The sample sizes were: in 2010 N=86, in 2011 N=91 and in 2012 N=124. The result was that using video lectures did not result in better exam results in the experimental course, when comparing the groups with or without video lectures. However, the number of failed exams decreased significantly, from 15% to 2% out of the returned exams. In addition, a survey among the students clearly showed that video lecturing made studying more convenient for the students.

KEYWORDS

video lecture, streaming video, Moodle LMS, screencast

MATERIALS AND METHODS

The idea of strengthening the learning by utilizing video lecturing was the result of previous experiences on the target course. The impression was that part of the students felt that they had an inadequate opportunity to take advantage of their individual prior knowledge on the course topics while at the same time some students felt that the basics of the course topic were not covered in sufficient depth. When trying to reduce this conflicting fundamental problem, video lecturing seemed to be the most promising technique.

The video lecture opportunity, allowing students to proceed at their own pace based on their own skills, seemed to be able to support both the most competent students and less experienced students simultaneously. Motivation for this paper was to study whether it is possible to verify the benefits of video lecturing in practice and what possible downsides there are in the new lecturing method. The study was started in 2010.

Process Description for Creating Video Lecturing Material

There are different types of learners; usually learners are divided to visual learners, auditory learners and kinaesthetic learners. The individual style of learning is defined by the strongest way of adoption of new information [1]. The main intention of the use of video lectures on the experimental course was to activate all three different types of learners; video demonstrations of the administrative assignments activate visual learners, the lecturer's narration of the theory background and the assignments activates auditory learners and the assignments that learners carry out with the help of video lectures activate kinaesthetic learners.

Creating video lectures as source material for the course might be challenging and time consuming on many courses. However, if the purpose of the lecture is to learn something that can be shown or used on the computer screen, it is relatively easy to convert this type of instructor-led training to the screencasting type of video lectures.

The capturing method for some of the screencast applications is that they only take screen captures based on triggered events on the capturing computer without support for continuous video capturing. This can lead to unwanted miss of important actions on the screen and force one to record the entire screencast again [2].

Screencast type of video lectures were created with just one laptop computer, HP EliteBook 8530p (Intel Core 2 Duo T9400 processor and 4GB of memory), using the Microsoft Media Encoder x64 software. That one laptop had to run the capturing software and two virtual machines (Windows 7 Professional and Windows 2008 Enterprise Server) simultaneously on top of Windows 7 Professional 64-bit operating systems. These virtual machines have to be able to run smoothly without any annoying delays, while everything that appears on the screen has to be saved without any interference in the screencast recording.

Video Lecture Distribution

The total length of the five video lectured topics produced for this paper was 6 hours and 18 minutes and they covered 20 hours of the classroom exercises. The bit rates calculated from the compressed video files vary from 604 kbps to 648 kbps depending of the content of the compressed video. It is possible to distribute the video lectures to students in several ways. Each way has its strengths and weaknesses. Selection criteria for the video lecture distribution method were that the system had to be robust, affordable, user-friendly and possible to be integrated to the existing Moodle learning management system.

Video lectures as plain video files can be easily published in the Moodle learning management system, but then students must download a large video file before they can start watching the lecture. Creating and sharing removable media copies of the video lectures can accelerate the sharing of the video files, but there is limited interaction with the video lectures if they are shared as files. It seems that all the large-scale initiatives using video lectures have applied streaming video services combined into efficiency-enhancing web portals. Video streaming is something that today's students expect. It is easy and fast to use and it is simple to embed in most learning environments. Thus streaming video seemed to be the only appropriate alternative to publish video lectures to the students and therefore it is the only method used in this experiment.

Figure 1 shows the Viddler.com streaming video player embedded to the Moodle learning management system. The timeline of the video player has white dots indicating the manually created labels for key points of the lecture.

Figure 1. Video lecture with Moodle and Viddler.com communication channels

When the viewer keeps the mouse pointer over one of the dots for a while, the player shows a message bubble with the time tagged description or the subtitle of the pointed section of the video.

When students watch video streams through Viddler.com's own embedded video player, it is possible to allow students to make their own notes, comments and video comments to the video timeline as shown in Figure 1. In this experiment the features were not allowed, to ensure that all the communication of the course topics went through the official communication channels of the Moodle learning management system.

RESULTS AND ANALYSIS

All of the examined student groups had the same learning objectives and they all took two exams that were the same for different student groups. Also, the first part of the study that dealt with the administering of UNIX and Linux operating systems were lectured in the same way for Groups 1, 2 and 3. The only exception was Group 4, which completed the whole course without classroom training.

Analysis of the Effect of Video Lectures on Students' Exam Points

For Groups 1, 2 and 3 the video lectures were only used in the Windows part of the course assignments. That gives the opportunity to evaluate the effect of video lectures on the learning outcomes by comparing the exam points of the groups. The effect of video lectures on the students' learning outcomes was examined through the average points that each control group acquired from the second exam of the course. That part of the course dealt with the administering use of the Windows operating systems.

Figure 2 shows the average exam points of each group in both exams (Linux and Windows part of the course).

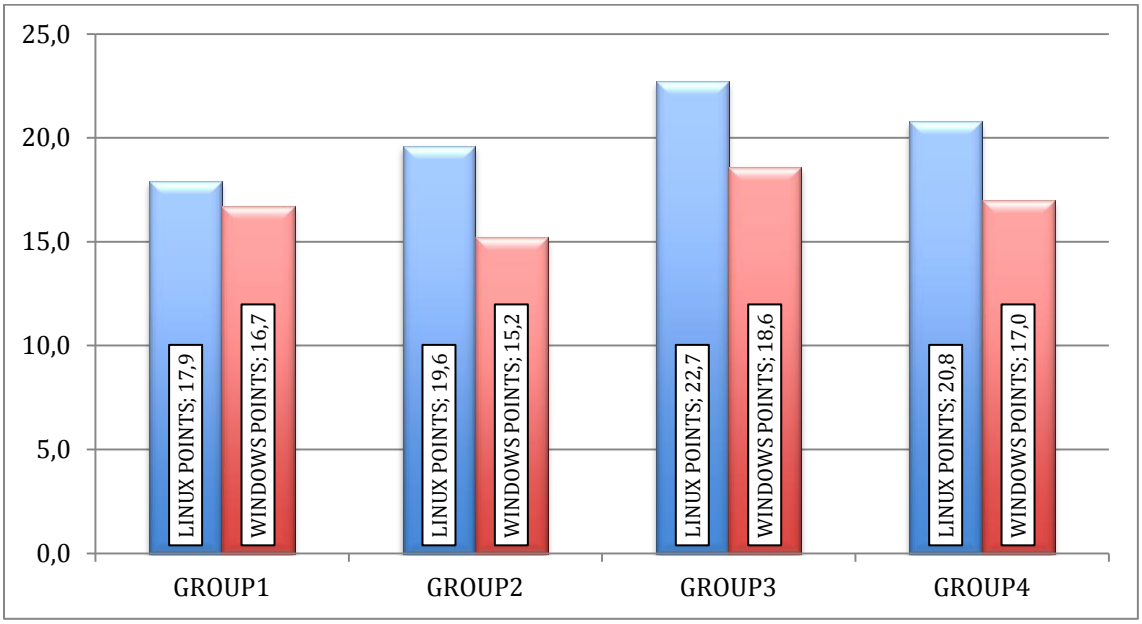

Figure 2. Exam points of study groups in Linux and Windows exams

As can be seen in Figure 2, the Windows exam was more difficult for all control groups, with and without the use of video lectures.

Group 1 had 23 hours of classroom training for the content of the Linux exam and for the Windows part of the study they had 24 hours of classroom training. Group 1 did not use the video lectures at all; it was used as a reference group.

For Group 2 the video lectures were available and used as course material during the Windows part of the course. Group 2 had 23 hours of classroom training for the content of the Linux exam. For the Windows part of the study they had 17 hours of classroom training.

By comparing the exam points of Groups 1 and 2 it is possible to detect an unfavourable effect in the exam results for Group 2 in the Windows exam. Group 2 got higher average points from the Linux exam than Group 1, but in the Windows exam the average exam points of Group 2 were lower by 9%, compared to those of Group 1. From this it is possible to conclude that for Group 2 the use of video lectures was not helpful from the perspective of exam results. That was unexpected because the classroom situation seemed to be very promising and also the feedback from the student survey gave a positive impression.

For Group 3 the video lectures were a mandatory part of the course and they were used as course material during the Windows part of the course. Also, a substantial part of the video lectures was used as obligatory distance learning tasks to compensate for the small number of the classroom training hours. Group 3 had 18 hours of classroom training for the content of the Linux exam. For the Windows part of the study they had 12 hours of classroom training.

Group 3 got more average exam points from the Linux exam than Group 1, and also in the Windows exam the average exam points of Group 3 were higher than those of Group 1. However, there was a bigger decrease from the average exam points of the Linux exam to the Windows exam in Group 3 than Group 1.

The good results of Group 3 in both exams stand out in Figure 2. They got the highest average exam points in both exams even though they had less classroom training than Groups 1 and 2. This may be the result of the special feature of Group 3 that they are all adults and all of the students in that group have already worked in the information technology sector.

For Group 4 the video lectures were obligatory course material during the Windows part of the course. Group 4 did not have any classroom training for the content of the Linux and Windows exams. By comparing Group 4 to Group 1 it is possible to detect that in both of those exams the average exam points of Group 4 are higher. However, there was a bigger decrease from the average exam points of the Linux exam to the Windows exam in Group 4 than Group 1. The relatively high exam points in both of the exams for Group 4 is possibly a result of the fact that this group of students was selected based on their own interest to carry out this experimental course as an asynchronous online course and therefore probably had higher motivation.

Student Evaluation of Using Video Lectures

The obtained exam results alone do not give an adequate general view of the suitability of the video lectures for the experimental course; therefore it was decided to organize a student survey to determine how the students experience the use of video lecturing material during the course.

Figure 3 shows the numeric results of the survey conducted with Group 3 students. From the 17 members of the group, 10 gave their response, so the response rate with Group 3 was 59 percent.

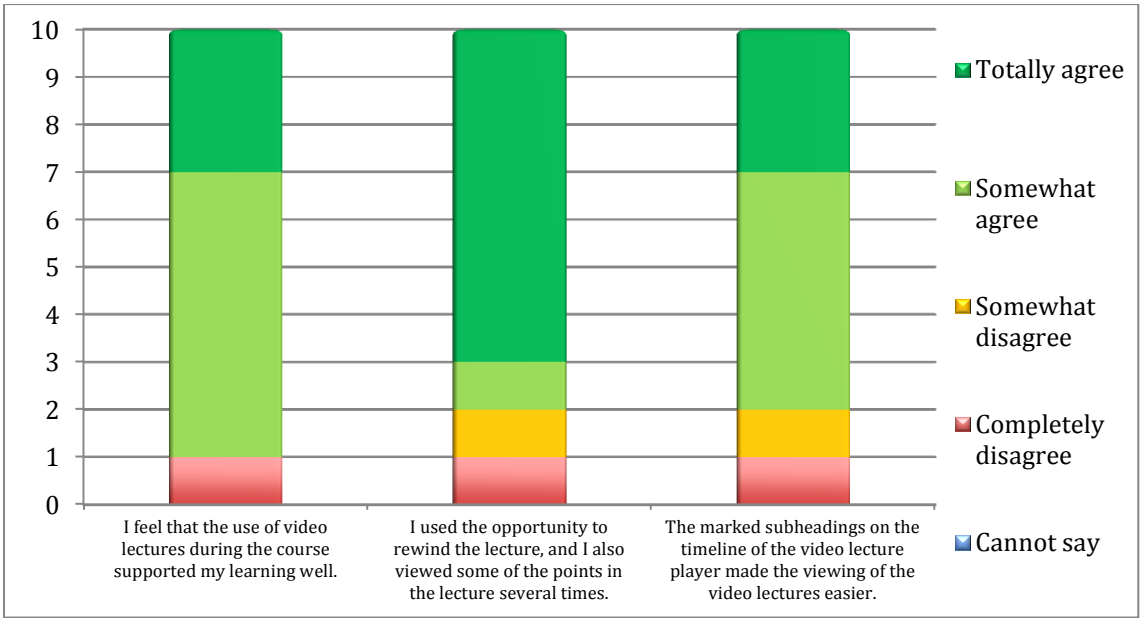

Figure 3. Results of the survey with Group 3

The students were asked to react to the following statements: 1. I feel that the use of video lectures during the course supported my learning well. 2. I used the opportunity to rewind the lecture, and I also viewed some of the point in the lecture several times. 3. The marked subheadings on the timeline of the video lecture player made the viewing of the video lectures easier.

The results of the survey are in line with the observations made in the classroom training sessions with the video lectures. Video lectures seem to be a pleasant way to learn the subjects of the experimental course, although its benefits are difficult to prove with the exam points of the course.

Students also had a possibility to give some free written answers to the question “Was there anything special you want to share about the way video lecturing was used on the course, about usability or about learning with the help of video lectures in general?” The free feedback from the students in the survey was solely positive and the general spirit of these messages was that they hoped to have an increased number of video lectures available in the future.

Below are some of the free feedback comments that students mentioned in the survey: “It was possible to go through the exercises at your own speed, and you had the opportunity to return to the point that remains unclear.”; “Video lectures support distance and adult learning well.”; “Video lectures gave an opportunity to focus on learning in peace and quiet, without distractions.”

Figure 4 shows the numeric results of the survey conducted with Group 4. From the 23 members of the group, 8 give their response, so the response rate of Group 4 was 35 percent.

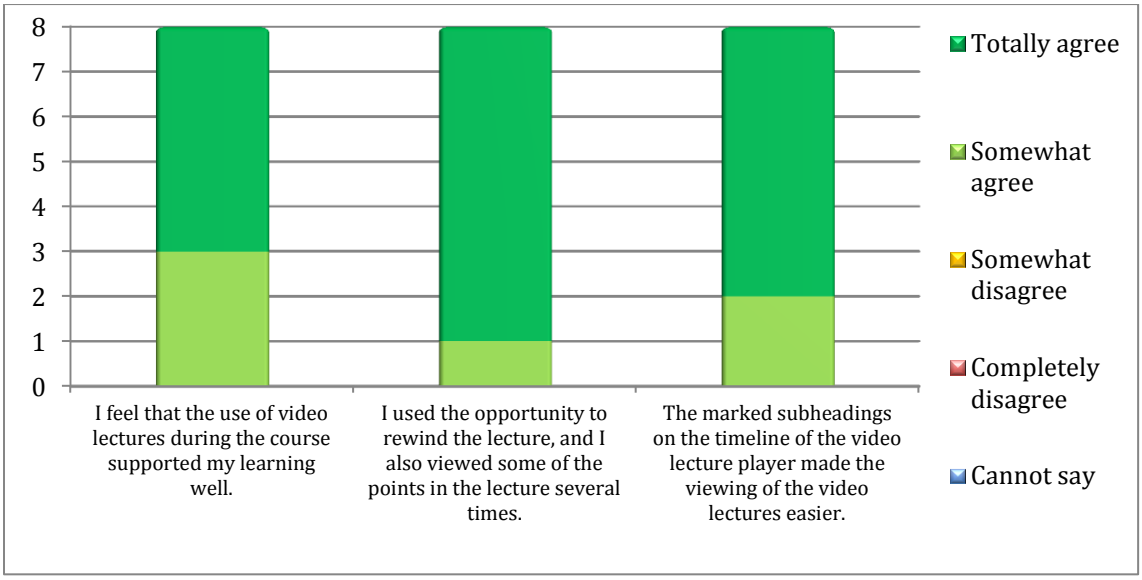

Figure 4. Results of the survey with Group 4

The most significant feature of Group 4 was that they did not have any classroom training during the experimental course. For that reason the observation of how the students use the video lectures was considerably more challenging, and it was also more challenging for the teacher to have a perception of the students' progress during the course.

Considering that the video lectures were planned and created as supporting material for the classroom training assignments, it was surprising how excellent the acquired exam points and the feedback from the student survey were with Group 4. This suggests that when the lectures are recorded and the lectured content and its presentation are planned as video lectures, the recorded lecture material may be suitable to be used for both synchronous and asynchronous learning, at least if the students themselves can choose which kind of implementation they are willing to go through.

DISCUSSION AND CONCLUSIONS

After a careful planning and preparation of the video lectures, the recording of the lectures was unexpectedly smooth. For the teacher, the recording of the video lecture is nearly the same as giving a typical classroom training type of lecture.

The video streaming service Viddler.com, which was used to publish the experimental video lectures to the Moodle learning management system, operated throughout the course without any detected or reported problems. Also, the feature of displaying manually created labels on the embedded video player timeline and that way supporting the enhanced video browsing capabilities for the students was an advantageous feature that was valued in the answers of the student survey. Some teachers may appreciate the possibility to use private video files as video lectures and still being able to embed that private content to the Moodle learning management system.

Video lectures also have great potential in the student's personal learning environment, because the student can utilize many simultaneous information sources to gather the information required to accomplish course assignments. With the possibility to use video lectures the students can have more control of their own time and place of studying. The benefit of using video lectures does not necessarily influence the course grades directly but they may still be beneficial for studies and the student's career development.

The experience from the experimental course and the feedback from the students during the classroom training and from the student survey bring out numerous advantages that are possible to achieve when video lectures are used. However, in all cases video lectures increase the teacher's workload. Also, the benefits of using video lectures were not manifested as better results in the exams on the experimental course between different groups with or without video lectures. At the same time it is obvious that video lectures make studying more convenient for the students.

As a summary it can be said that video lectures are a good way to show what universities are really doing. However, many lecturers have to update and rearrange the content of their course when converting it to support the video lecturing environment. This converting process of the course material takes a considerable amount of teachers' time and the results of this effort are not necessarily shown in the students' exam results.

Video lecturing systems make it easier for the teachers to create video lecturing material, sometimes even automating the process. With the use of free open-source platforms such as the Opencast Matterhorn project, it is possible for the universities to lower the technical and cost barriers to start using a video lecturing system [3].

The amount of video lecturing material that was used to study the effectiveness of the video lecturing and produced for the experimental course was 6 hours and 18 minutes. That video lecturing material covered 20 hours of classroom training exercises on the experimental course. Each of the five video lectures was viewed an average of 118 times, which means 1.85 times per student for whom it was available.

Since the experimental course in 2010, video lecturing has been used comprehensively on the course on hardware and operating systems. The video lectures now cover the whole course. The students have had unlimited access to the video lectures with total length of 13 hours and 18 minutes covering 45 hours of classroom training. Figure 5 shows the numeric development of the student achievement when the use of video lecturing on the course increases and becomes more commonly used.

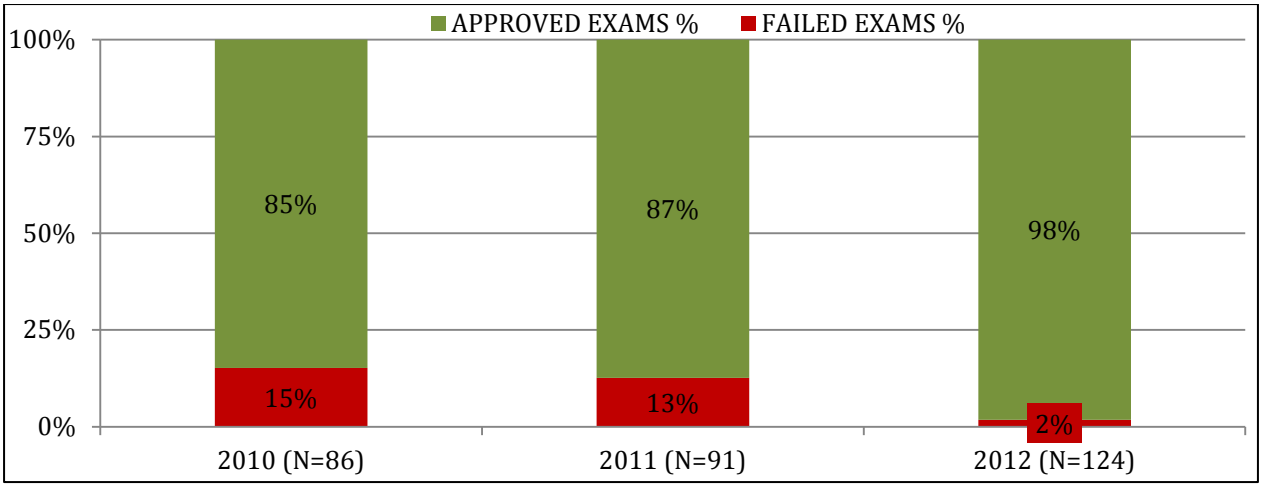

Figure 5. annual student achievement development on the course

In autumn 2012, 124 students participated in the course where almost all of the course content was studied using video lectures. The most significant finding was not improved grades but the fact that the number of failed exams decreased significantly.

In the future it appears that learning will become increasingly fragmented and to succeed in the education, universities have to adapt better to students' life in different situations. Video lecturing and especially the possibility of learning independent of time and place seem to be a valuable opportunity to enable efficient distance learning in these challenging conditions to busy young and adult students.

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