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**Author(s):** Myllymäki, Mikko; Hakala, Ismo

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# TEMPORAL DIFFERENCES IN PARTICIPATION MODES IN VIDEO-BASED BLENDED LEARNING PRACTICE

M. Myllymäki, I. Hakala

*University of Jyväskylä (FINLAND)*

## Abstract

In traditionally organized education, the education provider also determines the teaching schedules. Education in accordance with the blended model and based on videos can be realized, when so wished, in such a way that the student will be free to decide about his/her time use. In this kind of environment students can still study in accordance with the proposed pedagogical model at a pace determined by lecture sessions so that the previous lecture is always seen before the next face-to-face teaching session. Study can also completely adapted to one's own pace. In this case, the student watches the lecture videos before an exam, not worrying about the pace of face-to-face teaching. This research examines, with the help of temporal classification of participation modes, students' participation and the effects of the participation mode on learning outcomes in an environment based on videos and in line with the blended model. The learning outcomes are examined from the viewpoint of both course grades and course completion. The results suggest that the choices related to time use made by the student have effects on learning outcomes.

Keywords: blended learning, lecture videos, distance learning, adult education, lecture attendance, study modes.

## 1 INTRODUCTION

Arranging education for adult students creates new challenges for education providers. Working adult students and adult students with families often have special needs related to time use. These needs often manifest as reduced opportunities to participate in the education provided. One way to increase the flexibility of participation in education, while better taking the student's life situations into account, is to realize that education in accordance with the blended learning model employing lecture videos. Lecture videos can, in these cases, function as an alternative to face-to-face teaching in study participation. Maintaining face-to-face teaching alongside videos enables choosing of one's study participation mode: it is possible to physically attend face-to-face teaching, study from distance with a real-time video transmission taking place simultaneously with face-to-face teaching, or study from distance in a delayed mode with the help of on-demand videos. When lecture videos and other study-related activities, such as interactivity and distribution of study material, are realized so that they are suitable also for mobile devices, the student can access, independent of time and place, all the material needed for study.

In education realized in a traditional way, face-to-face teaching, but often also online teaching, is already scheduled by the provider of education. Even though the course start in the case of online courses can be flexible, the progression of the course is typically, however, scheduled. In education based on videos and in line with the blended model, the variety in the ways of participation allows the student to time the study in accordance with his/her own personal schedule. In this kind of learning environment, the student is able to choose the participation mode that best suits for his/her life situation. The student can study fully traditionally, relying on face-to-face teaching, or, on the other hand, as a distance student relying on lecture videos and other tools enabling study from distance. The student can also flexibly combine face-to-face study and distance study and study according to the blended learning model the way he/she wishes. The participation mode of the student thus moves on the scale, similar to that depicted in Fig. 1, between face-to-face and distance study, depending on the ratio of video lecture usage.

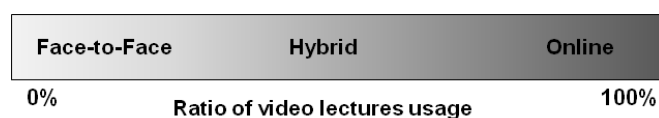


Figure 1. Distribution of students' study participation by the extent of video utilization

Purely from the viewpoint of face-to-face teaching, the student can, in a temporal sense, participate in study in real time, simultaneously with face-to-face teaching, or in non-real-time, deviating from the pace determined by face-to-face teaching. Real-time participation thus includes, in addition to participating in face-to-face study, also study with the help of real-time video. On the other hand, study at the pace of face-to-face teaching is, in the case of videos, a flexible concept. If a lecture video is to be viewed before the next face-to-face teaching situation, one can still refer to this as study at the pace of face-to-face teaching. So it may be thought that a student who studies with the help of on-demand videos studies still at the pace determined by face-to-face teaching. On the other hand, the student's ability to freely define his/her time use enables study at one's own pace without being dependent on face-to-face teaching. This is referred to as studying with delay. In this case, the student watches the lecture videos before an exam at the time regarded as the best for the purpose.

Earlier studies have examined student participation in connection with lecture videos. These investigations, however, have focused mainly on the amount of participation in teaching and, above all, on the effects of lecture videos on the participation in face-to-face study [1][2][3][4][5][6][7]. Also the effects of lecture recordings on learning outcomes have been considered in earlier research [3][8][9][10][11]. On the other hand, we are not aware of any studies in which participation and learning outcomes would have been examined through a participation mode classification defined temporally in relation to face-to-face study.

Although flexible teaching solutions are constantly being developed it is still difficult to find implementations where the students can freely select the flexible ways to participate to the education and which covers the whole educational program. So the educational solution that this research examines is a very unique. Still the results of this study can be generalized widely for example to many kinds of distance education.

In this research, we examine participation modes with the help of temporal classification in an environment based on videos and in line with the blended learning model. The investigation aims to find out how students participate in study timewise and whether temporally determined participation modes affect the extent of participation or learning outcomes. The learning outcomes are examined from the viewpoint of both course grades and course completion. The results in this article are based on analyses of log data collected from transmissions of videos for 38 courses between 2008 and 2012, on attendance statistics collected about face-to-face education and on the register of study credits.

## **2 RESEARCH FRAME**

The research data was collected in connection with the Master Studies in Mathematical Information Technology at the Kokkola University Consortium Chydenius. The students participating in the degree program are working adults for whom participation in studies is challenging due to time use limitations.

The students live across a wide geographical area. Those living at the furthest distance are located 500 km away from the campus. A long travel distance to the place of learning together with simultaneous work and study are the most significant limitations placed on the students' participation in face-to-face teaching. To increase flexibility, all teaching in the program is arranged according to the blended model.

All teaching for the students is arranged as face-to-face teaching, which is recorded and offered to them as real-time and on-demand video. The timing of the teaching is based on the face-to-face lectures. Face-to-face teaching is arranged for Friday afternoons and Saturdays. The courses are scheduled to be run as very compact entities in such a way that, typically, a single course is run in a few weekends. In practice, this means that the duration of a single lecture session equals 3-4 traditional lectures. Thus, from the temporal point of view, the courses are typically implemented, so that the lectures are every week, or every other week, on Fridays and/or Saturdays. Lecturers plan their courses pedagogically taking this timing into account.

The students can participate in the degree program's study either face-to-face, with the help of direct video transmissions or by using on-demand videos. The students do not need to decide about their participation mode beforehand; they can choose to participate in each lecture the way that suits best for their life situation or study preferences. Thus, the student can participate in each lecture of a course study in many different ways by flexibly combining various alternatives. Lecture videos have been used in the degree program already for several years; therefore, studying with their help was already familiar to students during the research.

The research data consists of information on 77 students. These students participated in 38 courses during 2008–2012. The total number of course participations was 500. The material consists of attendance data collected from face-to-face teaching situations, log data of viewing of lecture videos and information from the register of study credits. A student was counted as a participant of a course if he/she participated at least in one of the course lectures, either through face-to-face education or with the help of videos. The courses were assessed using either a pass/fail scale or a whole number scale from 0 to 5 where 0 indicates fail. The data was subjected to statistical manipulation.

## 2.1 Student Classification

For the research, the students are classified in relation to temporal differences in study participation. They were divided into two categories based on the time component in their study. Fig. 2 shows the classification

The student can, in a temporal sense, participate in study in real time, simultaneously with face-to-face teaching, or in non-real-time, deviating from the pace dictated by face-to-face teaching. Timewise, participation in study is a flexible concept if recordings are made available. If a lecture video is viewed in the form of an on-demand recording before the next face-to-face teaching session, one can still refer to this as study at the pace of face-to-face teaching. On the other hand, if the first participation in study with the help of on-demand video occurs only after the next lecture session, one may think of this as studying with delay in relation to face-to-face study.

Therefore, participation in education can be classified timewise as follows:

*A student is counted to study at the pace of face-to-faces if at least 50% of his/her average study participation takes place as face-to-face study or with the help of real-time video or with the help of on-demand video before the next face-to-face teaching. Otherwise, the student is regarded as studying with delay.*

In first category studying takes place in accordance with the proposed pedagogical model at a pace which teaching is designed to study. In the second category the student watches the lecture videos before an exam, not worrying about the pace of face-to-face teaching. It means that studying is completely adapted to one's own pace and it is conducted against the proposed pedagogical model.

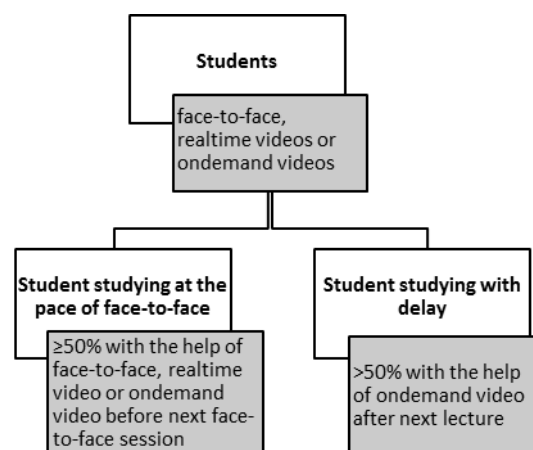


Figure 2. Classification based on temporal differences in study participation.

## 3 RESULTS

First, we will examine the distribution of students in categories explained above. After this, we will concentrate our examination on students' learning outcomes, aligning them with the classification. The learning outcomes will be examined from the viewpoint of both course grades and course completion.

### 3.1 Monitoring of Temporal Participation in Education

Fig. 3 shows how students are divided into those studying at the pace of lecture sessions and those studying with delay. It is important to note that face-to-face teaching seems to have great significance in pacing the study in a blended teaching model organized in this way where participation in the study

can be very flexible. Based on Fig. 3, five-sixths of all students study at the pace determined by face-to-face teaching. Thus only one-sixth of the students in this research seem to study independently of face-to-face teaching and according to their own schedules.

Of these students 85% live at a distance of more than 50 km from the campus and 15% at a distance of 50 km at most from the campus area. Because of distance it might be difficult for them to participate with the help of face-to-face teaching, but they could still participate in real-time or watch the videos before next lecture if they wish.

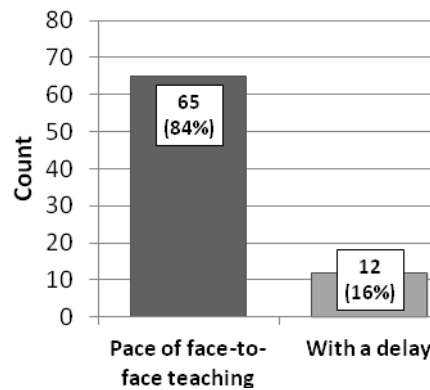


Figure 3. Classification of students (N=77).

Table 1 provides more details of the participation modes within the classification presented earlier. When we look the participations of those studying at the pace of lecture sessions, we can see that the clear majority, five-sixths, takes place by the next lecture session at the latest. Similarly, of the participations of those studying with delay, the clear majority, four-fifths, are delayed. Therefore, the classification of students seems to separate students on the basis of their participation mode into two coherent categories.

Based on the results, it seems that the students, when necessary, can make use of the flexibility that videos provide. Participation modes of the students studying at the pace of face-to-face teaching are distributed relatively evenly. Students take advantage of the increased flexibility, however, mainly by taking the designed pedagogical model into account. On the other hand, those studying in pace of face-to-face teaching use on-demand videos sometimes (14,1%) also after next lecture.

Students who are studying with delayed mode participate mainly with the help of videos. About their participations of more than 95% is conducted by using on-demand videos and face-to-face teaching is almost in non-existent role.

The results indicates that typically, the students are not constrained into only one way of participation in education provided; as far as time is concerned, they seem to participate in a very flexible manner. Quite a few things have influence on temporal choices: work load at the time, study subject, own study preferences or time use limitations due to family life.

Table 1. Average temporal participation modes for students studying at the pace of face-to-face teaching and students studying with delay. (N=77).

Participation modes	Students studying at the pace of face-to-face teaching	Students studying with delay
Face-to-face	30.9%	0.6%
Real-time	21.4%	4.1%
On-demand video (before next lecture)	33.6%	15.0%
On-demand video (after next lecture)	14.1%	80.3%

As the Fig. 1 illustrated the major part of the students study undoubtedly at the pace of face-to-face teaching, though with some delay. Still one-sixth of all students used the opportunity provided by the videos to study fully in accordance with their own schedules. The existence of this group was possible to notice only by examining the temporal differences in participation modes. For these students, the selection of study mode is probably a conscious decision rather than a solution dictated by circumstances. It is therefore useful to examine whether temporally determined participation modes affect the learning outcomes.

### 3.2 Importance of Study Pace on Learning Outcomes

Learning outcomes are examined in relation to the classification presented. Fig. 4 and Fig. 5 present the learning outcomes of students studying at the pace of face-to-face teaching and those studying with delay. The learning outcomes are examined with the help of course completions and grades obtained.

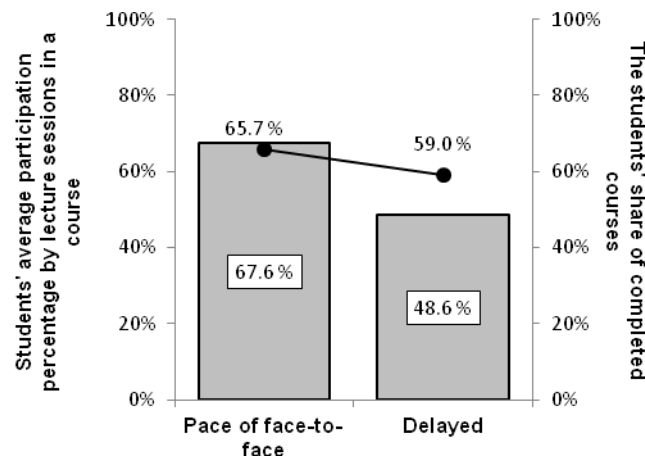


Figure 4. The averages of average temporal participation shares and the averages of the shares of completed courses. (N=77)

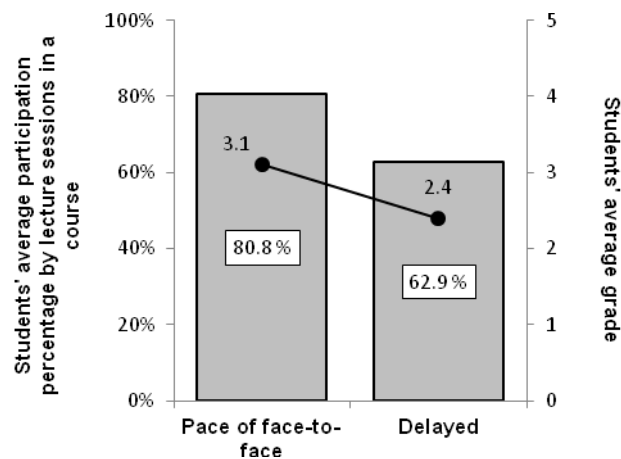


Figure 5. The averages of average temporal participation shares and of average course grades in (includes the courses that have been completed with approved grades). (N=57)

Fig. 4 shows that there are no big differences in completion percentages between those studying at a pace which teaching and those studying with delay. The difference is not statistically significance either ( $p < 0.327$ ). When the students' average participation degrees are examined, it can be seen that

students who are studying at the pace of face-to-face teaching have a better degree of participation. The difference between groups in relation to participation degree is also statistically significant ( $p < 0.016$ )

The examination of grades includes only the courses that have been completed with approved grades. It can be seen in Fig. 5 that the grades of those participating at the pace determined by lecture sessions are on average clearly better (3,1 against 2,4). Although the difference is clear no statistical significance could be shown ( $p < 0.166$ ). Also in this case students studying at the pace of face-to-face teaching have a clearly better degree of participation. This difference is also statistically significant ( $p < 0.010$ ).

The group studying at the pace of face-to-face teaching includes students participating in many different ways. When focusing on students who participate mainly with face-to-face teaching, one can observe that the degree of completion, 63.0%, and the grade average, 2.9, were slightly below those of the whole class. On the other hand, when considering the students who participated mainly with on-demand videos before the next lecture, it was noted that both the average degree of course completion 77.8% and the grade average 3.5 were clearly better in comparison with the completion and grades of the whole class. The corresponding values for the whole class were 65.7% for completion and 3.1 for grade average. Thus, it seems that, when studying at the pace of lectures, those who in their participation make use of the flexibility provided by videos perform better. This result supports an earlier research result [9] according to which students using videos a lot complete their courses better and also get better grades. In that research, the focus was on tool use instead of chronological considerations.

## 4 DISCUSSION

With the help of videos, students can be provided with flexible opportunities to participate in study. The results of the research seem to indicate that the students, in fact, use the flexibility afforded by videos for their benefit. However, when the students are offered the chance to freely choose their participation mode, most of them endeavor to study at the pace with face-to-face teaching. The students thus seek to participate in the study in accordance with the pedagogical model defined by the education provider. This would clearly suggest that the education provider should consider pacing of the study and its timewise design as carefully as when organizing face-to-face teaching, even where the education in accordance with the blended model is in question. The results, in this respect at least, can probably be generalized also to actual distance study courses.

In the research data we still have small group of students who study completely adapted to one's own pace. The existence of such a group of students also raises the question if it can be better taken into account in the future when designing the implementations and pedagogical solutions of the courses. Nevertheless, it should be noticed that in spite of belonging to a certain category the students participated in study in other ways also when necessary. Participation by the students was very flexible, and they clearly made good use of the flexibility that videos provided.

In light of the results, it seems that the students who participate in accordance with the pedagogical model defined by the education provider, that is, participate in the lectures always before the next lecture, get grades that are above average and complete the courses better than average. This is quite certainly explained by that the average participation degree of these students is notably better than that of the students who do not study, timewise, in accordance with the pedagogical model. The students who study with delay probably put more effort on their study during the final stages of their course, closer to the exam. This research does not give an answer to whether the choice of participation mode of those who study with delay is due to that they feel this kind of study suiting best for them or that the requirements of work and family life force them to participate in this way. Nevertheless, we can assume that, at least to a certain degree, it is a matter of voluntary choice for the student because participation at the pace with face-to-face teaching would be possible by viewing the lecture videos any time, typically within a week.

In earlier research [9] it was noticed that students using videos a lot complete their courses better and also get better marks. Better degree of participation made possible by videos has been seen as the principal reason for this. In this research, the focus was on timewise participation instead of tool use. The results of this research and those of the earlier research suggest that the education realized with the help of videos in accordance with the blended model provides the greatest benefits to students who use the increased flexibility, afforded by the technologies, in their participation in education while nevertheless abiding with the pedagogical model designed by the education provider.

## 5 CONCLUSIONS

In traditionally organized education, the education provider also determines the teaching schedules. Typically also online courses are, to a certain extent, following a schedule of some kind. Education in accordance with the blended model which is based on the lecture videos provides the student with a fairly far-reaching freedom to decide about his/her time use. When the lecture videos are offered to the students the concept of study participation is wider. In addition to the face-to-face teaching area, it is possible to participate also in other places with the help of real-time video and also at other times with the help of on-demand video. Participation must therefore be understood in a different way. This paper considered these choices of participation modes and their effects on learning outcomes.

The students in the research data were divided into those studying at the pace of face-to-face and to those studying with delay. The major part of the students belongs in the first category. Still one-sixth of all students used the opportunity provided by the videos to study fully in accordance with their own schedules. The existence of this group was possible to notice only by examining the temporal differences in participation modes. For these students, the selection of study mode is probably a conscious decision rather than a solution dictated by circumstances.

The research results indicate that there are differences in the extent of participation and in learning outcomes between students' participation modes. According to the results, for those studying at pace of face-to-face teaching obtain better grades and also complete the courses better than students who watch the lecture videos before an exam, not worrying about the pace of face-to-face teaching.

Overall, according to the results obtained, the videos seem to be an excellent solution in the context of the study. From the viewpoint of the education provider it is important to understand that face-to-face teaching has great significance in pacing the study in a blended teaching model. Also, in the context of distance learning courses sequencing and temporal aspects of the implementation are very important.

The results of this study suggest that it would be useful to examine the topic more deeply from the viewpoint of learning styles, for example.

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