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BLENDING AND FLIPPING A UNIVERSITY LECTURE COURSE: WHAT EFFECTS ON STUDENTS' ENGAGEMENT AND LEARNING STRATEGIES?

Lyndon Higgs

LiLPa, Université de Strasbourg

Mots-clés

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Keywords

blended learning - deep learning - flipped classroom - learning strategies - surface learning

Résumé

Cette étude analyse les effets de la transformation d'un cours magistral de grammaire anglaise en dispositif hybride de classe inversée sur l'engagement et les stratégies d'apprentissage des étudiants. L'analyse des données montre qu'un plus grand nombre d'étudiants s'engagent dans ce nouveau dispositif, en adoptant des stratégies d'apprentissage en profondeur, plus en adéquation avec les objectifs, le contenu, et l'évaluation du cours.

Abstract

This study analyses the effects on undergraduate students' engagement and learning strategies when a university lecture course in English grammar was transformed into a blended learning, flipped classroom environment. The analysis of the data shows an increase in the number of students engaging with the course and adopting deep learning strategies more in line with the course's objectives, content, and assessment.

Introduction and contextualization

The lecture course under study is a compulsory component of the third year of an undergraduate degree course in English, at Strasbourg University. The course, which I teach mostly in French, covers English grammar and linguistics, and introduces a methodology of sentence analysis typically used in French competitive examinations to become secondary school teachers of English. It was originally designed and taught (until 2019) as a weekly one-and-a-half-hour traditional lecture, over two semesters, making a total of 36 hours' teaching time each year (and counting for 1.8 ECTS[1] per semester). Around 100 students (mostly native French speakers) were enrolled in the course. There were no additional tutorials ("*travaux dirigés*"), and therefore there was little opportunity for students to apply the theoretical content taught in the lectures. However, at the end of every lecture, students were invited to work on exercises at home, before the next class, during which a sample correction was presented.

In 2017 and 2018, course evaluation questionnaires were administered to the students in order to collect their impressions about the course. The results showed that most students did not work on a regular basis for the course; they did not learn or revise the course content between lectures, nor did they prepare the exercises in advance; they simply took notes of the answers in class or downloaded them from the Moodle page a few days before the evaluation, during an intense revision phase of the course content. Two recurring remarks were found in the questionnaires: "I revise the course just before the exam by memorizing it", and "there is a lot to learn off by heart".

It was surprising to see that for many students, rote learning seemed to be the best way to prepare for their assessment, when in fact, what was required to pass the exam was concrete application and interpretation of the theoretical content of the course, not just rote restitution. Clearly, there was an imbalance between how they prepared for this assessment and what was required to succeed.

1. The pedagogical alignment of the course: an imbalance in learning approaches

The data obtained from the questionnaires encouraged me to analyse the pedagogical alignment of the course (Daele & Berthiaume, 2013) i.e. to question the alignment of four key elements: the course's objectives, the course's scientific content, the type of assessment, and the teaching methods employed. These elements were analysed with respect to the type of learning approach that each element requires from the learners, along with the associated

[1] European Credit Transfer and Accumulation System.

learning strategies. More information on these key concepts is given below, before returning to the pedagogical alignment of the course.

Romano (1991) and Larue and Hrimech (2009) define two types of learning approach: deep and surface. A surface learning approach involves mostly rote-learning, often without focussing on a real understanding of concepts. A deep learning approach, on the other hand, involves engaging with the content on a higher cognitive level, integrating and linking new concepts with previous knowledge and transferring this knowledge to new situations and contexts, often to solve a problem. Each approach involves different learning strategies, which Larue and Hrimech (2009) categorise into four types: 1) cognitive strategies (which include, for example, memorising and/or organising knowledge); 2) metacognitive strategies (self-assessment and regulation strategies enabling learners to situate themselves in their learning process); 3) affective strategies (which include maintaining motivation and managing emotions); and 4) management strategies (managing time, human and material resources).

Some strategies encourage deep learning (Larue & Hrimech, 2009). On a cognitive level, active processing of information (comparing new knowledge with previous knowledge, linking concepts together, organising and structuring information and identifying key elements in relation to others, using knowledge to solve problems, etc.) is the sign of a deep learning approach. Group work particularly encourages these active strategies, as it allows cognitive confrontation, or socio-cognitive conflict, between peers, enabling the learners to question prior knowledge, which is necessary for the long-term integration of new concepts (Vanpee et al., 2008). Larue and Hrimech (2009) summarise these active strategies as "making sense of information" (p.4). On the other hand, memorisation strategies that don’t include conceptualisation correspond to a surface approach.

The metacognitive strategies of frequent self-assessment and regulation are also the signs of deep learning: the learners assess the way they learn, as well as the state of their learning, and if necessary, they adjust their inefficient strategies. If, conversely, learners ask themselves few metacognitive questions (and are not concerned about their level of understanding before taking their summative assessment), surface learning then applies.

Affective strategies such as behaving in a way suggesting that the learner considers the task to be useful for their personal development, rather than seeing it solely as an institutional constraint, are also manifestations of a deep learning approach.

Management strategies such as allocating work time on a regular basis and using material and human resources (practising, doing extra reading, taking part in interactions with other learners and with the teacher, etc.) are signs of a deep learning approach.

Returning now to the analysis of the pedagogical alignment of the course, it showed that three of the four key elements studied - the course objectives, the course content, and the assessment type - required the students to adopt deep learning strategies. These were of several types: cognitive strategies (involving active processing of information, linking key concepts together, organizing and structuring information and locating essential elements with respect to others, using theoretical knowledge to solve practical problems, etc.); metacognitive strategies (involving a conscious self-evaluation of how one learns, and regulation of the learning process); and management strategies (working regularly throughout the semester, making full use of all material and human resources available, practicing, interacting with other learners and with the instructor, etc.).

However, the fourth element - the teaching method (a traditional lecture course) - clearly encouraged a surface learning approach, with cognitive strategies mostly involving memorization and rote learning, metacognitive strategies where the learner does not regulate or self-assess their learning process before taking the assessment, and management strategies where the students work on their own, often at the end of the semester, learning the whole course content off by heart.

2. Flipped classrooms, blended learning, and learning strategies

To rectify the pedagogical imbalance mentioned above, I looked for a teaching method whose learning environment would foster learner engagement (Parmentier, 1998) and in which students could confront their understanding of the scientific content of the course with their peers and with the instructor. This environment would allow them to work regularly and actively on a practical application of the course content in groups, in the lecture hall. A flipped classroom environment appeared to offer such advantages. The term ‘flipped classroom’ is used here to describe a learning environment where, to put it simply, the learners are introduced to the class content at home, and where they apply it in the classroom (Lakrami et al., 2018). Sherbino et al. (2013), Lage et al. (2000) (in Guilbault & Viau-Guay, 2017), Cooner (2010) and Bonk et al. (2006) all conclude that the flipped classroom encourages the learner to adopt cognitive learning strategies in line with deep learning, McLaughlin et al (2014) claim that students work more regularly, while Choi (2013) and Mason et al. (2013) show that the flipped classroom approach returns better results in evaluations requiring deep learning processes.

Encouraged by these positive outcomes, I decided to set up a blended course[2] based on the flipped classroom approach, thus freeing up time in the lecture hall for practical application of the class content.

In the academic year 2019-2020, a semi-flipped classroom system was initially experimented, whereby 45% of the course content was still delivered face-to-face, while the other 55% was transferred to videos available on Moodle, to be viewed before attending the class. In 2020-2021, 2021-2022 and 2022-2023, a 100% flipped classroom system was adopted (although in 2020-2021 most face-to-face sessions in the lecture hall had to be replaced by on-line sessions, due to COVID restrictions).

3. The new blended flipped classroom environment

This new system was first implemented in its full form (100% flipped) at the beginning of the academic year 2020-2021. Its aim is to improve pedagogical alignment and to provide a learning environment that is conducive to learners' engagement, and to their adopting cognitive, metacognitive and management strategies associated with deep learning.

It comprises the following elements:

a) The entire content of the lecture course is made up of 38 short videos (per semester), each lasting 10 minutes on average, and available on the course's Moodle page. In each video, the viewer sees a PowerPoint presentation, and hears the instructor's voice. Each video is labelled clearly for its content. For thematic reasons, some videos last less than 10 minutes (e.g. 6 mins) and a few last considerably longer (the longest lasting 19 minutes).

b) All videos for the entire semester are made available in the first week of class, and a detailed schedule is posted on the Moodle page. The students are told that there will be 2 assessments, one mid-semester exam and one final exam.

c) On class 1, the instructor explains how the course will be organised, and stresses the importance of working regularly throughout the semester i.e. watching the required videos each week (and taking notes as if in a traditional lecture) and attending class every week.

d) From class 2 onwards, students are expected to watch on average 3 or 4 ten-minute videos before attending the class.

[2] Here, the term "blended course" is used to describe a mixed learning environment, containing both face-to-face and online elements (Picciano et al., 2014).

e) In each class, the instructor begins with a visual reminder (diagrams, flow-charts, etc.) of the main content of the videos; this presentation is uploaded to the Moodle page. Then the students are asked to form (self-appointed) groups of 3 or 4. They are given exercises (similar to those in the mid and final assessments) and they work collectively (or individually, if they prefer) on preparing answers to the exercises. The instructor circulates in the lecture hall, answering questions and noting any recurrent problems. The instructor then projects a correction of the exercises and summarises the main problems that have been encountered. Activities are varied: sometimes, exercises are replaced by quizzes which can be answered on students' telephones, and the answers are displayed in real time on the screen. All corrections to exercises and answers to quizzes are made available on the Moodle page after each class.

f). There is a mid-semester assessment worth 1/3 of the overall grade, and a final assessment worth 2/3.

4. The study - research questions and data collection methodology

The first objective of this study was to determine how students engaged with this new blended flipped classroom environment. Did they actively take part in the group activities? How many students watched the videos, and when? To what extent were they satisfied with a flipped classroom approach regarding this course? What were their perceptions of advantages and disadvantages of this approach, compared to a traditional face-to-face lecture course? What improvements could they suggest?

Secondly, the study aimed to determine the extent to which this new blended flipped classroom environment encourages the adoption of deep learning strategies: in particular, cognitive, metacognitive and management strategies.

As already mentioned, this action-research was conducted over a period of 4 academic years: 2019-2020, 2020-2021, 2021-2022, 2022-2023. In 2019-2020, only 55% of the course content was transferred to video. In 2020-2021 and thereafter, 100% of course content was transferred to video.

The numbers of students enrolled in this obligatory 3rd year course were as follows:

2019-2020: 116 2020-2021: 102 2021-2022: 115 2022-2023 :75[3]

The methodology comprised the following instruments:

[3] This smaller year group was due to a higher drop-out rate in students' first and second years, mostly because of COVID restrictions.

a) I completed a logbook at the end of each session, noting students' reactions to the presentation of the new system during the introductory class, questions and comments during each session, spontaneous remarks on the system both inside and outside of the classroom, the number of students choosing to work alone during group sessions, etc.

b) At each session, I noted the number of students present.

c) An anonymous questionnaire was distributed at the end of the first semester of each of the four academic years. (see Appendices). In each case, to guarantee a maximum number of responses, the questionnaires were given on the day of the final assessment, and a response rate close to 95% was obtained each year.

In 2019-2020, 2020-2021 and 2021-2022, the same questionnaire was distributed, containing 13 thematic questions, most of which were followed by subsidiary questions on the same theme. There was a total of 10 multiple choice questions and 11 open-ended questions. The 13 questions targeted one (or more) types of learning strategies (8 on cognitive strategies, 4 on metacognitive strategies, 6 on management strategies), to determine whether students were engaged in a surface or deep learning approach. The questionnaire, which can be found in appendix 1, replicated 5 questions from a previous questionnaire (2017-2018) distributed to students during their final evaluation, to compare the effect of the new environment with the previous lecture format.

In 2022-2023, a different questionnaire was distributed, containing 15 thematic questions, 3 of which were followed by subsidiary questions on the same theme. There was a total of ten multiple choice questions, and 8 open-ended questions. The questions targeted students' use of the videos (regularity, number of videos watched, note-taking, etc) or students' level of satisfaction with the learning environment (advantages, drawbacks, improvements, etc). This questionnaire can be found in appendix 2.

In section 5 (results), responses obtained from single select and multi select multiple choice questions will be given in percentage form, to facilitate comparisons over the four academic years. In the case of open-ended questions (where the number of respondents (= r) was less than 95% of those enrolled), the number of responses (= n) for each category type will be given.

d) Six semi-directed individual interviews were performed in 2019-2020, 2021-2022 and 2022-2023. The interviews were designed to elicit more detailed answers to the questions found in the questionnaires. The six students were chosen to represent a mixed panel of learners based on their (ir)regularity of viewing the videos, (non-)attendance in class, and grades obtained.

e) The number of students having watched the required videos was recorded (using Moodle data analytics), both immediately before each face-to-face session and immediately before each assessment (mid and end of semester).

Table 1 summarises the data collection methodology.

Instrument	Academic year	Semester (S1 / S2)	Commentary
Logbook	2019-2020	S1 & S2	I took notes immediately after each class
Logbook	2021-2022	S1 & S2	I took notes immediately after each class
Logbook	2022-2023	S1 & S2	I took notes immediately after each class
Attendance	2019-2020	S1 & S2	Number present recorded at each class
Attendance	2021-2022	S1 & S2	Number present recorded at each class
Attendance	2022-2023	S1 & S2	Number present recorded at each class
Questionnaire	2018-2019	End S1	Questions on learning strategies
Questionnaire	2019-2020	End S1	Questions on learning strategies
Questionnaire	2020-2021	End S1	Questions on learning strategies
Questionnaire	2022-2023	End S1	Questions on use of videos, satisfaction, etc.
Interviews	2019-2020	End S1	Questions on learning strategies
Interviews	2021-2022	End S1	Questions on learning strategies
Interviews	2022-2023	End S1	Questions on use of videos, satisfaction, etc.
Moodle page	2019-2023	S1 & S2	Number of students watching each video a) before work sessions; and b) before exams.

Table 1. Summary of Data Collection Methodology

5. Results

The results are presented according to the research objectives detailed in section 4: documenting student engagement with the blended learning environment (5.1) and understanding students' learning strategies and approaches (5.2).

All questionnaires and interviews were originally in French; in this paper, they have been translated into English.

5.1. Student engagement with the blended learning environment

5.1.1. The logbook

a) Students' initial reaction at the start of the first semester

After presenting the new system in the first class of each academic year, (including a comparison with the old system, presentation of the results of the previous year's questionnaire, highlighting some comments made by the previous year's students, etc.), I noted in the logbook that the students were visibly enthusiastic about the idea of working in groups in the lecture hall, and watching the course content at home.

b) Group work in the lecture hall

I noted that around 90% of students did indeed work in groups during class time. Although the traditional tiered seating configuration of the lecture hall was far from ideal, it did not pose any real logistical problems. A few students worked alone, either out of preference or because they did not dare to join a group (I chose not to intervene in these cases). In the logbook, I noted that some students who had worked alone in the first session moved during the second session so that they could work in groups.

I was surprised by the number and variety of questions I was asked during these group work sessions. I was expecting to have to answer a few questions about the exercises that the students were in the process of analysing. In reality, the scope of the questions went far beyond that. The students asked questions not only about the exercises, but also about other parts of the videos they had watched before coming to class. I realised that these sessions gave them the opportunity to overcome their difficulties in understanding the material, with my help. This one-to-one interaction never occurred in the previous lecture system.

c) Mid-semester paper access

After the grades were published on Moodle, several slots for the students to access their exam papers were offered. I was surprised by the large number of students (generally over 40) who came to have a look at their papers and ask questions (compared to previous years when a maximum of 5 students attended these sessions).

d) Spontaneous reactions

I was able to gather informal comments on the system from some of the students when they checked out their exam papers, and at other times outside the course. They generally commented positively on the flexibility that the videos gave, especially for those who were unable to attend the whole course (some worked part-time, while others reported a problem of incompatible schedules).

Here are examples of comments and suggestions from the students, recorded in the logbooks (the comments have been translated into English):

The videos are great. I can re-watch the parts I didn't understand. (log 2019-2020)

> The videos are really good. Everyone says so. (log 2019-2020)
>
> It's good that each video has a specific title. What would be even better is to put a reminder of the lesson plan at the top of each slide, so that you can see where you are more clearly. (log 2019-2020)

As for the group activities, most comments recorded in the logbook were also very positive, underlining the advantage of being able to help each other if they were having difficulty, the fun aspect of the activities, and the fact that they were varied within a 2-hour class.

5.1.2. Students' perception of, and participation in, the group activities

The impressions mentioned in the logbook concerning a high level of student participation in the group activities in class were confirmed by the responses obtained in the three questionnaires submitted between 2019 and 2022. Figure 1 shows that when the group activities took place in the lecture hall (2019-2020 and 2021-2022) around 70% of students declared that they effectively worked in groups. When held online (2020-2021, due to COVID restrictions), only 56% of students worked in (virtual) groups.

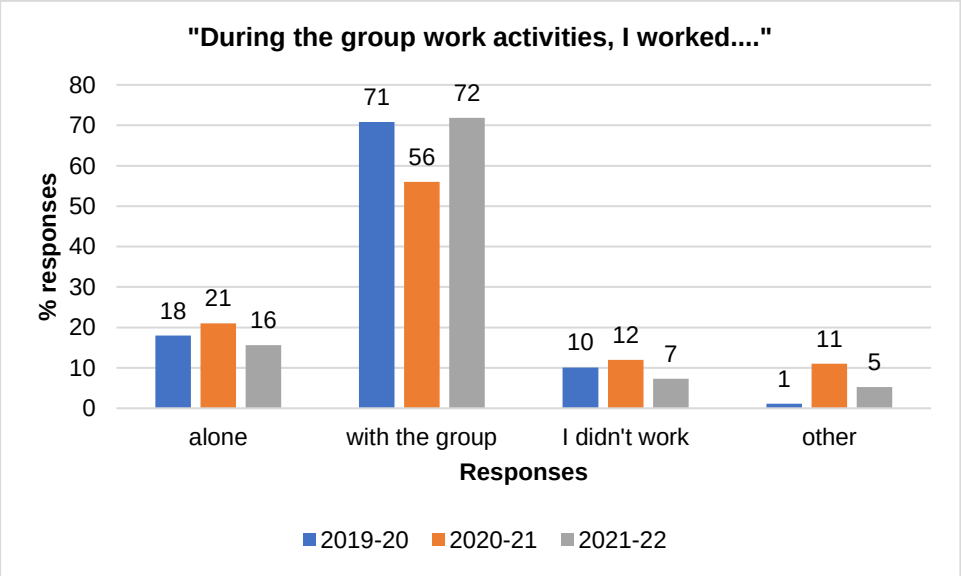

Figure 1. Responses to the question "During the group work activities, I worked...." (questionnaires 2019-2020, 2020-2021, 2021-2022)

A similar pattern emerges when students were asked to rate how useful they found these activities: when the activities took place online, only 30% of students found them "very useful", compared to 44% and 47% in 2019-2020 and 2021-2022. Overall, however, in all three years, around 80% of students found the group activities either "very" or "quite" useful.

The reasons students gave for working in groups will be examined in section 5.2.1. on cognitive learning strategies.

5.1.3. Students' perception of the flipped classroom - viewing videos

In response to the question "Did you watch the required videos before coming to class?", the results obtained varied across academic years. Figure 2 shows that in 2018-2019, when only half of the course content was transferred onto video, only 32% of students "always watched" the videos beforehand. This compares to 50% in 2020-2021 (when students attended classes online), 38% in 2021-2022 and 51% in 2022-2023. Overall, an average of around 70% of students (over the four years) declared having "always" or at least "nearly always" watched the videos in advance of class.

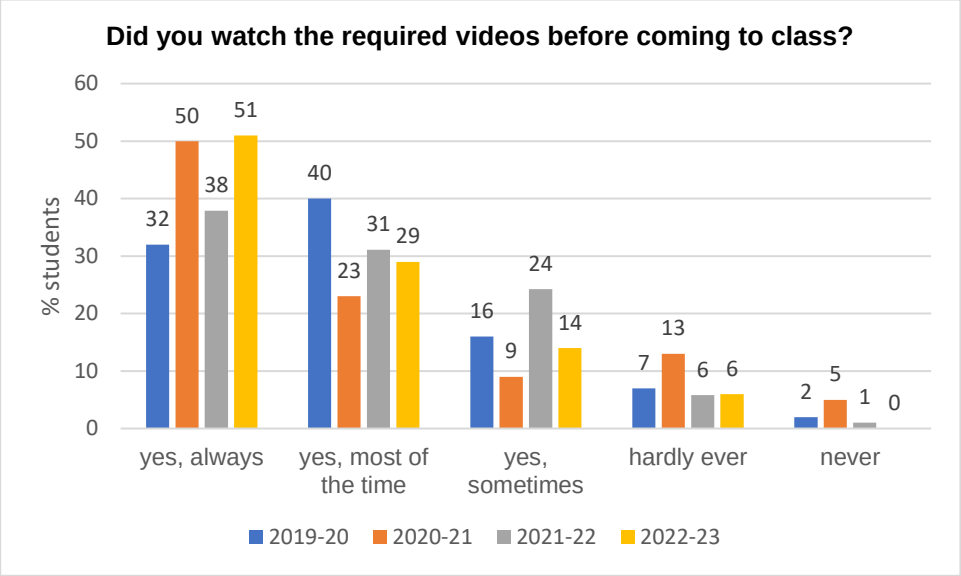

Figure 2. Responses to the question " Did you watch the required videos before coming to class? (questionnaires 2019-2020, 2020-2021, 2021-2022, 2022-2023)

When asked why they didn't always watch the videos in advance of class (questionnaire 2022-2023), of the 20 responses obtained, 15 stated that they had asked friends to give them a written version of the videos. However, in response to the question "If you read a written version of the content of the video rather than watching the video, how do you rate your comprehension of the content?" (questionnaire 2022-2023, 41 responses), 23 students responded that they understood the video more easily than in its written form, while 8 students preferred the written version, and 10 students claimed that there was no difference for them.

Globally, then, the results obtained suggest that the majority of students adhered to the flipped classroom environment by watching most of the videos before attending class.

5.1.4. Attendance rates

This flipped classroom relies on two fundamental elements: watching the required videos and attending class in order to apply this content. Attendance is thus an essential component of the course, and clearly reflects student engagement. In the questionnaires across all four years 2018-2023, an average of 56% of students declared attending more than 80% of classes. The highest rate (74%) was found in 2019-2020, when half of the course content was still taught face-to-face (see Figure 3). In 2018-2019, when the content was taught 100% face-to-face, only 57% of students declared regularly attending classes, the others presumably preferring to study an unofficial written version of the course which was published by the student association.

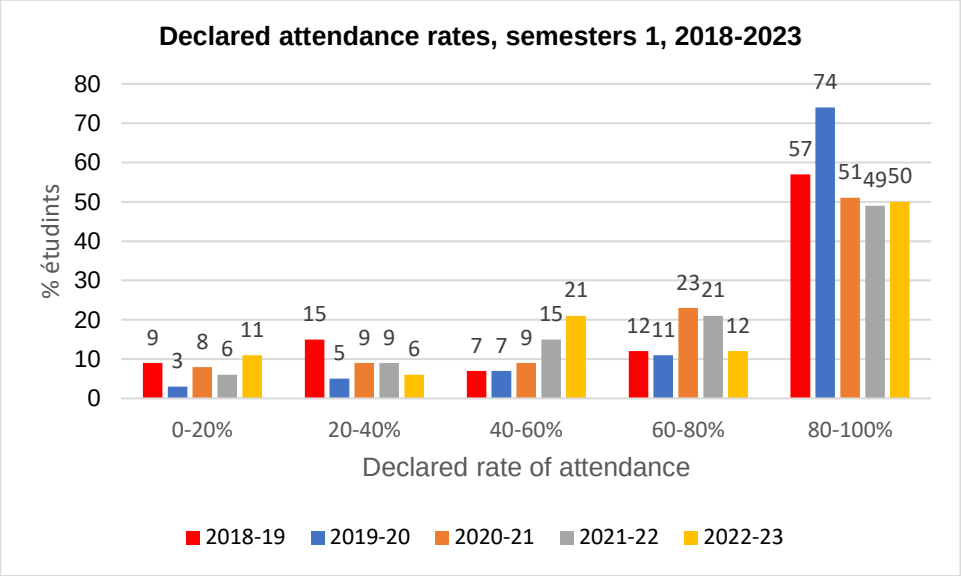

Figure 3. Declared attendance rates, semesters 1, 2018-23 (questionnaires 2018-2019, 2019-2020, 2020-2021, 2021-2022, 2022-2023)

Recorded attendance rates (students were counted at each session) correspond globally to declared attendance rates. Figure 4 shows that each year, attendance dropped after the mid-semester assessment, which according to the individual interviews was mostly due to an increased workload in other courses.

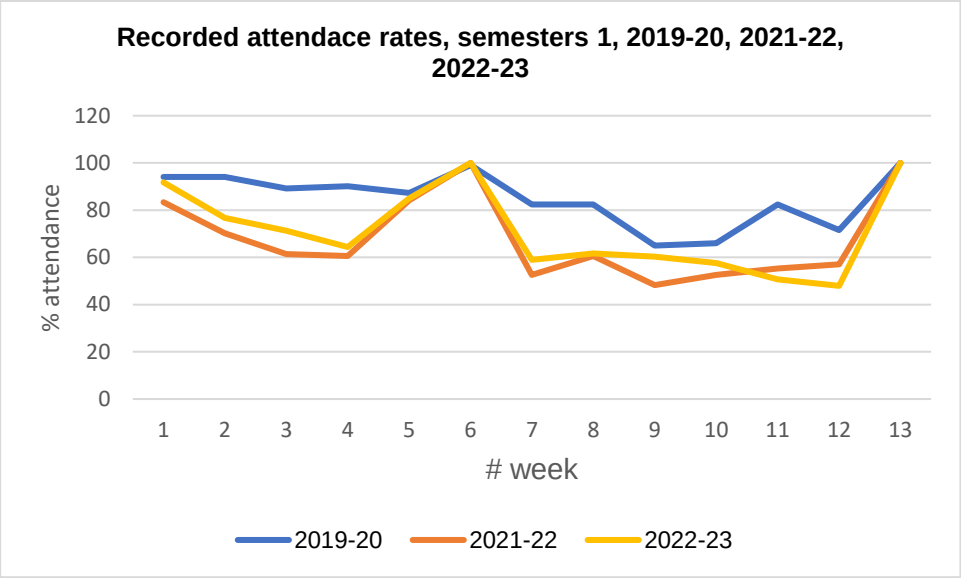

Figure 4. Recorded attendance rates, semesters 1, (questionnaires 2019-2020, 2021-2022, 2022-2023)

There was an average overall attendance rate of 74% over the three years 2019-2020, 2021-2022, 2022-2023, which suggests that students engaged positively with the blended learning environment.

5.1.5. Advantages and disadvantages of a flipped classroom

In the 2022-2023 questionnaire, students were invited to specify what they considered to be the advantages and disadvantages of the flipped classroom. Figures 5 and 6 show the results. The main advantage was being able to watch the videos several times (n=35) and to control the reception of the course content by stopping and rewinding them (n=33). A second advantage was being able to "watch them when I wish" (n=14) and to "work at my own pace" (n=12) i.e. increased autonomy for the learners. Interestingly, this idea of having more autonomy also appears prominently in the list of disadvantages: "You need to be motivated" (n=10), "It's easy to fall behind" (n=8), "There's no obligation to come to class" (n=3) and "You need to be autonomous" (n=2). This reflects findings published by Spadafora and Zopito (2018), who indicate that despite generally positive reactions from students (concerning more freedom and flexibility), they recognise that a blended flipped classroom environment demands a high degree of organisation and motivation; paradoxically, being free to watch the videos when they wish gives them "too much" freedom and they often end up falling behind in their work.

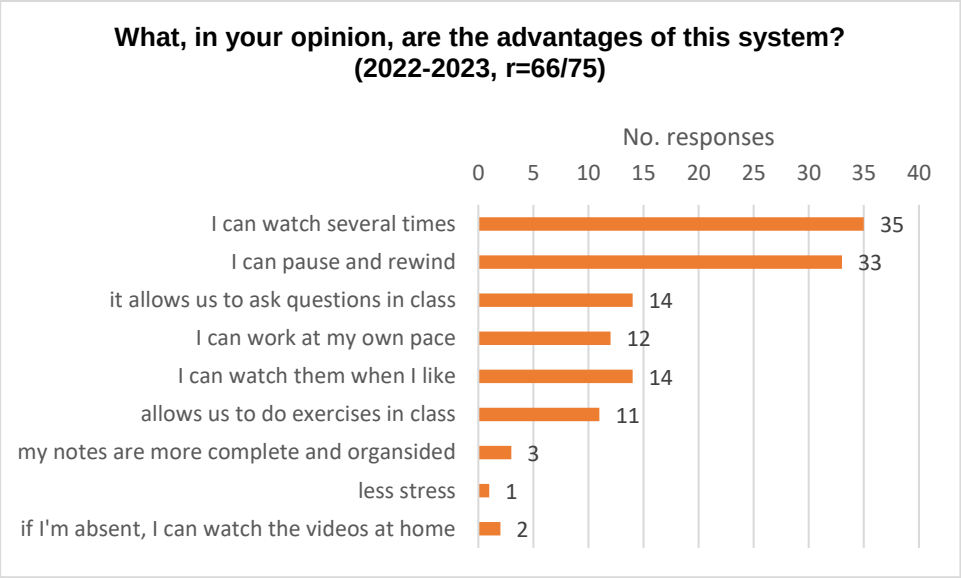

Figure 5. Responses to the question "What, in your opinion, are the advantages of the system?" (66/75 respondents, 2022-2023)

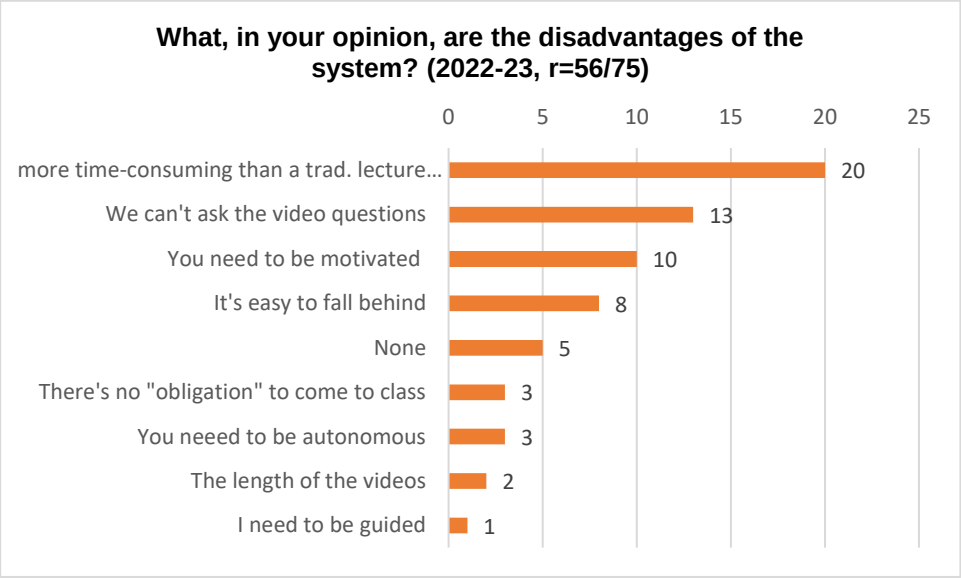

Figure 6. Responses to the question "What, in your opinion, are the disadvantages of the system?" (56/75 respondents, 2022-2023)

However, the main disadvantage quoted by students in the questionnaire was that a blended course is more time-consuming than a traditional lecture course (n=20). During the individual interviews, several students formed comments on this aspect:

> In the end, it's a really good system and I'm really pleased to have been able to be part of the experiment. I like being able to do the exercises in class. The disadvantage is that it's more time-consuming, but I really like linguistics so that's fine. (interviews 2022-2023)

> With the videos, we understand the course better, but it adds quite a lot of extra hours of work. But with better results. And I like having the teacher there when we do the exercises. (interviews 2022-2023)

> Watching the videos at home means a lot of extra work. With a traditional lecture, there's nothing to do before attending it, you just need to go and take notes. (interviews 2022-2023)

This last comment clearly highlights a perception shared by many students: to them, a lecture should be a self-contained unit that involves no outside personal work, either before or after it takes place. This opinion is clearly in contradiction with the principle behind the Bologna Process's system of ECTS credits, which takes into account both personal work and class time when attributing credits. For this course, worth 1.8 ECTS per semester, students could be expected to study approximately 30 hours outside of the 18 hours of class time.[4] There is only approximately 7 hours of course content to watch on video per semester, which, even if taking into account notetaking and revising, is still below the recommended ECTS workload.

5.1.6. Improvements

The most frequent answer given by the 19 respondents to the question "What improvements could you suggest?" in the 2022-2023 questionnaire was "shorter videos" (n=8). Other suggestions included adding quizzes on Moodle (n=4), a 50-50 flipped classroom (n=4) and making the written script of the videos available (n=2). "Shorter videos" was also the main response (n= 8/13) given to the question "What would encourage you to watch the videos more regularly?". One student formed the following comment:

> Psychologically, ten minutes is the max. Never go over ten minutes! In one video, you start by saying 'here's a short video...' and then it lasts 19 minutes! Awful! (interviews 2022-2023)

5.1.7. Overall satisfaction

When asked how satisfied they were with the blended learning environment (questionnaire 2022-2023), 90% of students replied that they were "very" or "quite" satisfied. This positive opinion is echoed in the responses given in questionnaires 2020-2021 and 2021-2022: if given the choice, around 70% of students would choose a 100% flipped classroom

[4] One ECTS credit is generally equivalent to between 25 and 30 hours of total study time. 1.8 ECTS = 45 to 54 hours of total study time i.e. between 27 and 36 hours of study time outside of class time.

environment, while 20% would prefer a 50-50 flipped system, and only around 8% a traditional lecture course. Two students formed these comments:

> Traditional lectures are no longer relevant. Now we've seen better ways to learn. (interviews 2019-2020)
>
> A lecture? No thanks. 50 pages of notes to write at top speed. And we'd have to do the exercises at home – and you wouldn't be there to help us. I wouldn't do them. (interviews 2019-2020)

This positive satisfaction rate confirms much previous research on the subject; in their meta-analysis of studies of university student satisfaction with flipped classrooms, Strelan et al. (2020) indicate that most results show higher levels of satisfaction than with traditional teaching methods.

5.1.8. Student engagement: a summary

The generally very positive comments recorded in the logbook were echoed in the questionnaires and interviews: 70% of students participated actively in group activities, 80% found these activities useful, 70% of students declared having watched most or all of the videos before coming to class, and the overall attendance rate over the four years was around 74%. Students appreciated the flexibility of the course, and the fact that they could control access to course content. However, this flexibility and freedom paradoxically triggered problems of self-regulation and motivation for some students, causing them to fall behind as the semester progressed, and some students complained that a blended course entailed more work than a traditional lecture.

5.2. Students' learning strategies and approaches

The questionnaires distributed in 2019-22, along with the individual interviews conducted in 2019-2020 and 2021-2022, shed light on students' learning strategies. In addition, changes in these strategies were highlighted by comparing answers to some of the questions in the questionnaires distributed in 2018-2019 (traditional lecture course) and 2019-22 (blended course).

In this section, the most salient results of the study are grouped according to three types of strategies mentioned in section 1: cognitive (5.2.1), metacognitive (5.2.2.), and management (5.2.3.).

5.2.1. Cognitive strategies: group work and controlling the videos

The question "why did you / why didn't you work in a group?" aimed to explore the cognitive strategies involved in the classroom activities, which were designed to encourage students to work collectively on exercises, applying their theoretical knowledge to solve problems. These

activities also aimed to encourage deep learning management strategies such as using all resources available to them (interacting with other learners, with the instructor, etc.) as well as metacognitive strategies of self-evaluation and regulation.

Table 2 gives the (open) responses to this question in the 2019-2020 questionnaire. Clearly, the most popular response, “It helps me to understand”, would tend to suggest that for many students, this group work did indeed favour cognitive strategies typical of deep learning.

Response	Number of occurrences
It helps me to understand	20
To help each other	10
It’s more interesting / fun	6
To evaluate ourselves	6
Sharing knowledge	4
Confronting our ideas	2
I prefer to work alone first	3
I dropped out	3
I work better alone	2
No one next to me / friend	2

Table 2. Responses to the question “Why did you / didn’t you work in a group?” (questionnaire 2019-2020)

A subsidiary (open-ended) question, “If you did work in a group, what did you get out of it?” reinforced this hypothesis (see Table 3).

Theme	Examples	Number of occurrences
« understand »	« I understand my difficulties more easily » « I understand more quickly » « highlighting things I didn’t understand, helping the others » « I understand more when working with others» « I understood what I didn’t know, and what type of question we’d have in the exam »	14
« explain »	« we can explain to each other » « we share our knowledge »	14
« Confront »	« we can confront our opinions » « having another point of view on how to understand the class » « it allowed me to work with the content and to understand it better, by explaining it to the others et by getting it explained to me in a different way than that which you used in the videos”	4
« apply »	« knowing how to apply the content is essential » « application of the theory »	4
« work alone »	« I prefer to work alone / I work better alone » « not useful if I haven’t seen the videos »	3 2

Table 3. Responses to the question “If you did work in a group, what did you get out of it?” (questionnaire 2019-2020)

Some of the individual interviews echoed the importance of working together on exercises to improve deep learning:

> I really enjoyed it, because you were there to answer our questions, and we realised we don't all have the same way of explaining or justifying things. Sometimes I didn't understand something and my friends were able to explain it to me. It was a really efficient system. (interviews 2019-2020)
>
> We nearly always come to class. Once I didn't come because I hadn't watched the videos. But last week I came anyway, even though I hadn't watched them. I still managed to do the exercises in the group, because you give a summary at the start of each class and because the others helped me. Then afterwards, I watched the videos to catch up with some stuff I hadn't understood. When we do the exercises in class, it helps me to remember parts of the videos, it makes things a lot clearer. (interviews 2021-2022)
>
> Really good – it's the first time I've seen such a thing. It was really useful because it forced us to do the exercises in class – which we probably wouldn't have done at home. If there was something I hadn't understood, someone in the group could always explain it to me. (interviews 2019-2020)
>
> For me it was the most important part of the course, because in the exam we need to be able to apply the contents. Not learn stuff off by heart. And I was really able to apply the content. (interviews 2019-2020)

However, not all students shared this positive view. One student commented:

> I feel more at ease with a traditional lecture. You come to class, you take notes, and then at home you do the exercises – or wait for the sample answer in the next class. (interviews 2021-2022)

Globally, though, most responses concerning the usefulness of group work were positive, underlining the importance of cognitive engagement in the deep learning process (Choi & Wylie, 2014).

The questionnaires and interviews also shed light on students' use and control of the videos. The following remark is typical of the responses that students gave, both in interviews and in answer to the open-ended question "How are the videos different to face-to-face lectures"?

> In a face-to face lecture, nothing that the teacher says really goes in. All I do is take notes. And then at home I try and understand. But sometimes I can't make sense of my notes. Whereas with the videos, we've got time to understand what we're hearing, and to take notes correctly. (interviews 2021-2022)

In the 2022-2023 questionnaire, 80% of students declared that they watched the videos once, pausing them frequently. When asked why they pause (52 respondents), 49 answered that it was to take notes, 16 answered "to understand", and 3 replied that it was to anticipate and analyse the following examples. The majority of students agreed that a video lasting 10 minutes required approximately 20 minutes' work in total.

The ability to regulate the flow of information seemed to be primordial for most students:

> I love the videos. 2 hours of lecture would be far too long. I can work on them at home when I like. You can stop them if you haven't understood, you can listen to them again if necessary. I often stop them to take notes and to understand. (interviews 2022-2023)

One student with autism said this:

> It takes quite a time, but for me it's really necessary if I want to understand. A ten-minute video, I cut it up into little sections. I often change where I'm sitting, the context, because it helps me to understand. I pause because sometimes it's too quick, and because I don't want to make notes on something I don't understand. (interviews 2022-2023)

Clearly, then, the videos appear to be advantageous for deep learning: rather than taking incomplete notes without having time to understand in a face-to-face lecture, students control the flow of information in the videos, to be able to assimilate and "make sense of" what they are hearing and writing (Laure & Hrimech, 2009).

5.2.2. Metacognitive strategies: self-evaluation and regulation

Self-evaluation is a process whereby learners assess the efficiency of their learning process, and, if necessary, regulate their learning strategies in order to better accomplish their goal. Both self-evaluation and regulation are typical of a deep learning approach.

In the old face-to-face lecture course, very few students attempted to self-evaluate their learning. Only around 45% attended the formative exam sessions that were organised one week before the mid and end-of-semester summative assessments; those absent from these sessions explained to me that it was "too early" to attempt a mock exam as they had not yet revised. Similarly, only 18% of students attempted to complete the exercises given at the end of each lecture, preferring to wait for the following lecture and to copy the sample answers to the exercises. Thus, for most students, the first opportunity to evaluate how much they had understood of the course was the day of the summative assessment.

In questionnaires 2019-2020 and 2021-2022, the question "If you had difficulties understanding the course, how did you realise you had these difficulties?" explores students' abilities to self-evaluate within the new blended learning environment. Figure 7 displays the answers to the question. By far the most popular answer is "through doing exercises in class" (more than 50%), showing that in this new system, self-evaluation (and the regulation that follows) is carried out mainly through group work and practice: the students ask each other questions, re-explain the course, correct each other, and interact with the teacher, in order to solve problems related to the exercises. This group work was, of course, absent from the previous face-to-face lecture course.

For many students, it was by attempting to explain parts of the course to their peers that allowed them to self-evaluate:

> I saw that I hadn't understood when the group asked me to explain something and I couldn't. If I can't explain it, it's not clear. (interviews 2019-2020)

For others, it was feedback from their peers that helped them confront their representations:

> When we started working together in the group, someone said 'I don't think you've really understood that'. (interviews 2019-2020)
>
> In general, I work with my friends, and we exchange ideas. It's really useful. It's by exchanging ideas that I understand, or that I see that I don't understand. It's much better than a traditional class where each student answers one question, then the teacher moves on to the next student. (interviews 2021-2022)

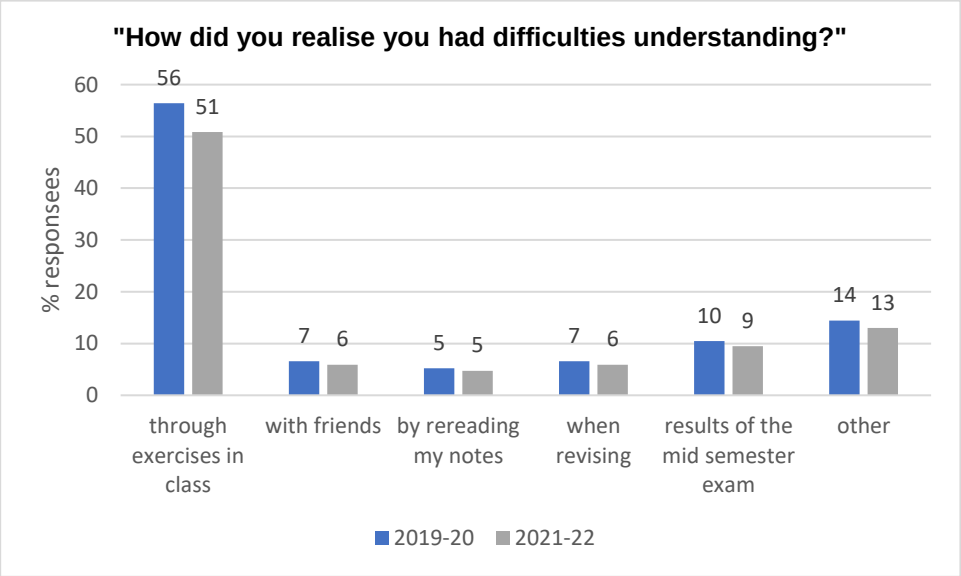

Figure 7. Response to the question "How did you realise that you had difficulties understanding?" (questionnaires 2019-2020, 2021-2022)

As a follow-up question to the one above, students were asked how they overcame any difficulties of comprehension they may have had (Figure 8). In 2019-2020, the most popular answer was "by discussing it with my friends"; in 2021-2022, this was the second most popular answer, after "doing more exercises".

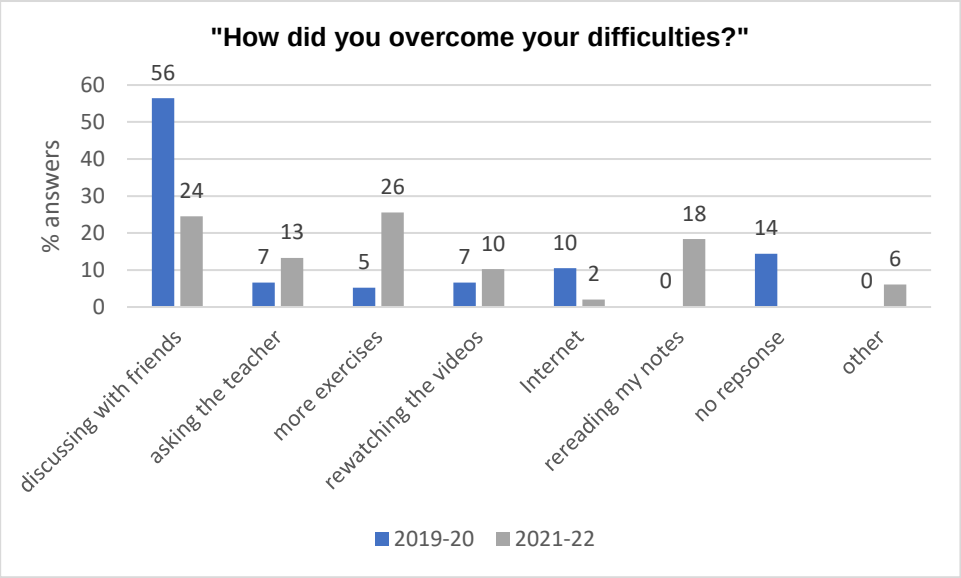

Figure 8. Responses to the question “"How did you overcome your difficulties?" (questionnaires 2019-2020, 2021-2022)

In conclusion, these results appear to show that the flipped classroom environment has indeed encouraged more students to adopt deep learning metacognitive strategies of self-evaluation and regulation.

5.2.3. Management strategies

One of the goals of the blended learning environment was to encourage more students to take up management strategies associated with deep learning; this included encouraging regular work throughout the semester, rather than an intense period of last-minute revision.

Questionnaire responses show that while the number of students reporting revising the whole course the week before the exam still remains relatively high (43% in 2019-2020, 53% in 2020-2021), more students choose to revise as the course progresses (+17% in 2019-2020, +10% in 2020-2021). This regular work - a sign of a management strategy associated with deep learning - is also reflected in the relatively high rate of viewing the videos.

Watching the videos before attending class is a key component of the flipped classroom course. Figure 9 shows the pattern of viewing in semester 1 of 2022-2023. This pattern has been typical of all semesters since the beginning of the blended learning environment in 2019-2020. The semester begins with an extremely high rate of viewing: around 80% of students study video numbers 1, 2, 3 and 4 before coming to class (see blue line in Figure 9). As the semester progresses, and despite regular reminders in class, this figure falls steadily, until less than 50% of students have watched videos 36 and 37 before coming to class. The red line in Figure 9 indicates the percentage of students having watched each video on the day of the assessment (mid or end of semester, depending on the number of

the video). This rate is typically +20% compared to the former, which means that a non negligeable number of students choose to study the videos immediately before the assessments. For these students, the group work sessions in class are not particularly useful as they will not have consulted the videos before attending – if, indeed, they attend.

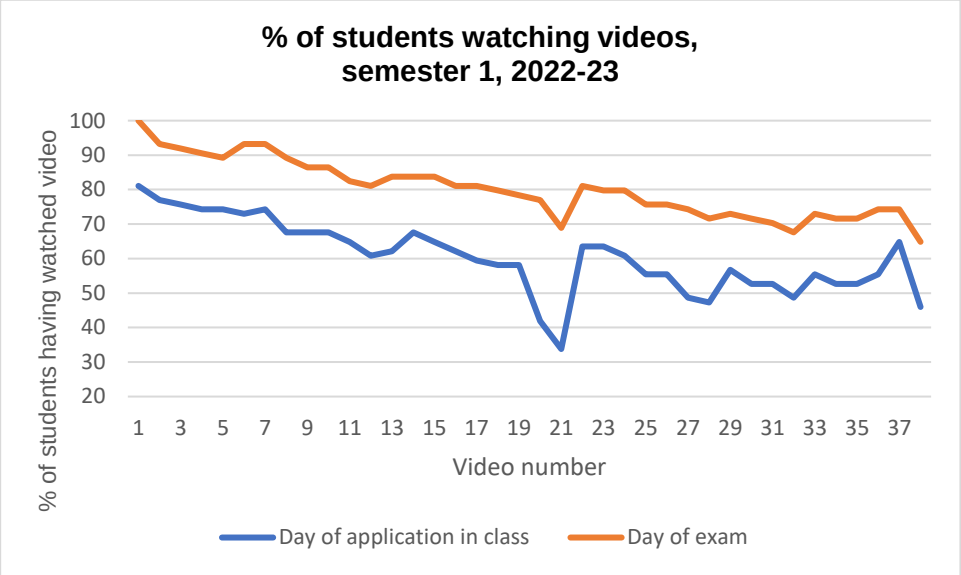

Figure 9. % of students watching videos, semester 1, 2022-2023

When asked why they didn't watch the videos before coming to class, 25 students (2022-2023) gave responses, by far the most popular one being "having no time". Individual interviews revealed that as the semester progresses, work requirements in other classes of the English course mean that often students feel overwhelmed by the number of assignments they have in a week – and they decide to postpone watching the videos until nearer the assessment:

> I watched them regularly at the start of the semester, but the workload in other subjects increased and I got behind. (interviews 2019-2020)
>
> I watched a lot of them but towards the end I got behind, and I sort of gave up. I got further and further behind. I borrowed a friend's notes and I reread the exercises that they'd done in class. (interviews 2022-2023)

This corroborates the findings of Spadafora and Zopito (2018), who highlight students' difficulties in managing their time effectively in blended learning flipped classroom environments.

5.2.4. Summary. Cognitive, metacognitive and management strategies: a movement towards deep learning?

Section 5.2. has shown that the blended learning environment has allowed a greater number of students to adopt cognitive strategies in line with deep learning: most students work in groups, actively solving problems and confronting their mutual understanding of the course; many students pause the videos to take the time to understand and take coherent notes that they comprehend in real time.

Similarly, their metacognitive strategies of self-evaluation and regulation, typical of deep learning, have been enhanced greatly through group work activities.

Lastly, their management strategies have evolved, but to a lesser extent: some students still adopt surface learning strategies of last-minute revision and last-minute studying of the videos, and some do not attend class regularly.

Conclusion

The study shows that more students engage with the new blended flipped classroom environment than with the traditional lecture course. Moreover, although many students' cognitive and metacognitive strategies are clearly more in line with a deep learning approach, some students still do not attend class regularly and prefer to watch the videos immediately before the assessments, thus missing out on the benefits of in-class practical application of the course content.

A preliminary analysis[5] of data from Moodle on students' viewing habits crossed with their results in summative assessments shows that the students who obtain the best results are, not surprisingly, those that watch all or most of the videos before the required date, in time to attend the classes where the content of the videos will be applied practically. Those who watch most or all of the videos, but only after the required date (probably immediately before assessments) actually scored less well than those who watched slightly fewer videos, but in time to attend the relevant classes.

Thus, for some students, regular viewing and regular attendance - both signs of deep learning management strategies – are still lacking. In the forthcoming academic year (2023-2024), this ongoing action-research will aim to encourage more students to adopt these strategies in three ways. Firstly, the introductory class and presentation on how a flipped classroom functions will be further developed, by including statistics from the previous academic year on the correlation between regular viewing, regular attendance and good

[5] A detailed analysis of the correlation between students' summative evaluation results, video viewing behaviour and attendance is currently in progress, and will be the focus of a forthcoming publication.

examination results. Secondly, students will receive regular e-mail messages serving as reminders that they should view the videos and attend class (some students declare that they sometimes “forgot” to watch the videos). Finally, the Moodle page will include some summative “mini tests” (counting minimally towards the final grade), which will only become available to students once the relevant videos have been viewed, and which will only count towards the final grade if completed before the corresponding class takes place (see Sadaghiani (2012) for the positive effects of monitoring video access on the regularity of students’ work).

It is hoped that a better understanding of the theoretical underpinning of the flipped classroom environment, along with frequent reminders and incentives to work regularly, will bring more students’ management strategies in line with a deep learning approach.

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APPENDICES

Appendix 1: questionnaire distributed in 2019-2020, 2020-2021 and 2021-2022. (translated from French into English)

"(2018)" indicates that the question was included in a questionnaire distributed in 2017-2018, in order to compare the effect of the new flipped classroom environment with the previous face-to-face lecture format.

Q1a. What was your approximate attendance rate for this course?

0-20 20-40 40-60 60-80 80-100 %

Q1b. Why?

Concerning the final exam (today):

Q2a. When did you revise for this final exam? *(only 1 response please)* (2018)

A: as the course progressed, and I completed my revision over this last week. B: I learnt most or all of the course content over this last week. C: I haven't revised for this exam. D: other response.

Q2b. Comments (if you wish to explain your response)

Q3. How did you revise for this final exam? (2018)

Q4a. Concerning the course content: *(several responses are possible)* (2018)

A: the course content has mostly been new to me. B: I saw this course content in my first and second year; I haven't learnt anything new. C: the course content followed on from what I learnt in the first and second year. D: the course content allowed me to make links with what I knew already, and to further my knowledge of grammar. E: other response.

Q4b. Comments (if you wish to explain your response):

Q5a. Do you think that there is a lot to learn off by heart? (2018) A: yes. B: no. *(only one response please)*

Q5b. Comments (if you wish to explain your response):

Q6a. If you had difficulties understanding the course content, how did you realise that you had these difficulties?

Q6b. How did you overcome your difficulties?

Concerning the videos:

Q7a. Did you watch the required videos before coming to class? *(only one response please)*

A: yes, always B: Yes, most of the time C: Sometimes D: hardly ever E: Never

Q7b. Why (not)?

Q8. On the day of the mid-semester exam, had you watched all the required videos? *(only one response please)*

A: Yes, all of them B: Yes, most of them. C. No, only a few of them D. No, none of them

Q9. Today, on the day of the final exam, have you watched all the required videos? *(only one response please)*

A: Yes, all of them B: Yes, most of them. C. No, only a few of them D. No, none of them

Q10a. If you watched them, which answer best describes how you watched them? For each video..... *(only one response please)*

A. I watched it once, without stopping, and without taking notes.

B. I watched it once, without stopping (or very rarely), and I took notes as if I were in the lecture hall.

C. I watched it once, stopping from time to time, and I took notes.

Q10b. Why did you stop the video?

D. I watched the video more than once. Why?

E. Other response. Please explain:

Q11. Compare your behaviour following a lecture in a lecture hall and watching a lecture on video. Q11a. How is your behaviour the same? Q11b. How is it different?

Concerning the group work in class:

Q12a. During the group work activities, I worked…. *(only one response please)*

A: mostly alone. B: with the group. C: I didn't work; I waited for the teacher to give the answers. D: other

Q12b. Why?

Q13. How useful did you find the group work activities in class? *(only one response please)*

A: very useful B: quite useful. C: not very useful. D: not at all useful.

Q13a. If you found them useful, what did you get out of them?

Q13b. If not, why not?

Appendix 2: questionnaire distributed in 2022-2023. (translated from French into English)

Q1. What was your approximate attendance rate for this course?

0-20 20-40 40-60 60-80 80-100 %

Q2. What grade did you obtain for your mi-term exam?

Q3 Did you watch the required videos before coming to class? *(only one response please)*

A: yes, always B: Yes, most of the time C: Sometimes D: Hardly ever E: Never
Why (not)?

Q4. On the day of the mid-semester exam, had you watched all the required videos? *(only one response please)*

A: Yes, all of them B: Yes, most of them. C. No, only a few of them D. No, none of them

Q5. Today, on the day of the final exam, have you watched all the required videos? *(only one response please)*

A: Yes, all of them B: Yes, most of them. C. No, only a few of them D. No, none of them

Q6. If you didn't watch all the videos, which answer best sums up your situation:

A : for those I didn't watch, I studied a written format of the content (obtained from friends, etc.)

B: for those I didn't watch, I didn't read the written format but I did read the summaries on the Moodle page.

C: for those I didn't watch, I didn't read the written form or the summaries on Moodle.

D: other response. Explain you answer:

Q7. If you sometimes read the written format of the video content instead of watching the video, how well do you feel that you understand?

A: I understand the course content better when I watch the video.

B: I understand the course content better when I read the written format.

C: It's the same.

Why? Explain your answer.

Q8a. If you watched them, which answer best describes how you watched them? For each video..... *(only one response please)*

A. I watched it once, without stopping, and without taking notes.

B. I watched it once, without stopping (or very rarely), and I took notes as if I were in the lecture hall.

C. I watched it once, stopping from time to time, and I took notes. Why did you stop the video?

D. I watched the video more than once. Why?

E. Other response. Please explain:

Q8b. For a capsule lasting 10 minutes, the time it takes you to watch and take notes is approximately …

A: 10 minutes B: 15 minutes C: 20 minutes D: 30 minutes E: more than 30 minutes

Q9. How many videos do you generally watch in a row?

A: all of the required videos for our next class. B: only a few videos; I watch the others later.

C: only one. Why?

Q10a. In your opinion, what are the advantages of videos, compared with a face-to-face lecture?

Q10b. In your opinion, what are the disadvantages of videos, compared with a face-to-face lecture?

Q11. What would encourage you to watch the videos more regularly?

Q12. What improvements could you suggest concerning this video system? (pedagogical or technical improvements, for example).

Q13. What is your degree of satisfaction with this system of videos replacing face-to-face lectures?

A: very satisfied B: quite satisfied C: not very satisfied D: not at all satisfied.

(if you wish to make other remarks on this course, please use the back of this paper)

Many thanks! I'll give you feedback on the responses to this questionnaire at the start of next semester.