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FLIPPED CLASSROOM: REINVENT YOUR TEACHING PRACTICE

With teaching cases, exercises, and implementation hacks

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EXECUTIVE SUMMARY

Flipped classrooms are more and more used among teachers of different educational levels. The word *flipped* implies the replacement of traditional schoolwork and homework. In a flipped classroom, the teacher facilitates student collaboration and problem solving at school. At home, students watch teacher instruction using different digital tools and videos and complete reading or some other type of learning activity.

Although the use of flipped methodology is increasing, many teachers still hesitate because of the belief that a teacher needs high ICT skills in order to flip the class. With the Flipped Classroom Handbook we show that high digital skills are not necessary. Many low technology activities create an engaged flipped classroom with real life problems which motivate students for learning.

To help teachers implement a flipped classroom in a flexible way with respect to their level of professional development we developed three ways of flipping the class: Moon, Mars, and Jupiter. The three ways help teachers and students become accustomed to a flipped classroom gradually in order to prevent technology overwhelming either teachers or students.

The Moon Flipped Classroom uses external digital and non-digital learning material as pre-class preparation followed by highly structured in-class activities. Most of the learning is guided by worksheets. Its simplicity enables students and teachers to change their mindsets about learning in school and learning at home. The Mars Flipped Classroom requires a bit more digital skills from the teacher but still adopts only simple apps and screen recordings, whereas the Jupiter Flipped Classroom builds upon open problem-based activities. This requires digital skills from both teachers and students.

The flipped classroom handbook would never have been created without the FACTIVE Erasmus+ KA2 project. The FACTIVE project promotes the adoption of flipped learning and gamification in textile and clothing training. Because of the international team, this handbook is not an ordinary handbook. During the writing process of this handbook, we combined field research with desk research. In February 2021, we organised an online Pan-European Conference on Digital Education devoted to the flipped classroom. Presenters from the FACTIVE project and schools showed six flipped classroom cases. Teachers from all educational levels contributed more than 42 poster presentations. 500 teachers participated in the live conference. The event gained 1.600 subsequent views in the first week after the conference. During the conference we also conducted a survey about the flipped classroom. 280 participants shared their experience with the flipped classroom. We used the oral presentations, poster presentations, and survey results from the conference, combined with desk research, as input for writing this handbook.

Insights by teachers, actual teaching cases, and tricks and implementation hacks are an integral part of this handbook thanks to a broader international audience who co-created this practical piece of knowledge.

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TABLE OF CONTENTS

INTRODUCTION

If you are interested in enhancing your teaching and students' learning, this handbook about the flipped classroom will help. You can learn **from actual cases** and **other teachers' experiences**. Having had in mind the everyday life of teachers and their busy calendars, we have prepared this practical handbook which makes the flipped classroom methodology easy to understand. **Insights by teachers, actual teaching cases, and tricks and implementation hacks** are an integral part of this handbook.

The first chapter defines the flipped classroom. It also gives scientific evidence on the benefits of implementing flipped classroom methodology, and highlights some of the experiences of the teachers using it. This chapter also provides answers to the most frequent questions teachers have about implementing the flipped classroom. The second chapter introduces three models of the flipped classroom to illustrate how the flipped classroom is appropriate for every teacher, regardless of their digital competency. The following chapters (three to five) describe three flipped classroom models, Moon, Mars and Jupiter, which include actual teaching cases highlighting the models in practice. The three models show how flipping a classroom actually changes the mindset of the teacher from being a lecturer to

being a facilitator. The sixth chapter reflects upon combining the flipped classroom with gamification.

The seventh chapter offers various activities to encourage brainstorming about the flipped classroom methodology. The following chapter focuses on digital tools and resources which were recommended by European teachers, and other participants of the Pan-European Conference on Digital Education. In the last chapter, the FACTIVE project is looked at.

This handbook is the result of teamwork. Not just from the members of the FACTIVE project, which initiated the creation of this handbook, but also the numerous teachers who regularly participate in the monthly Pan-European Conference on Digital Education and share their knowledge and experience. Thank you all!

The FACTIVE project promotes the adoption of flipped learning and gamification in textile and clothing training. Under the framework of the FACTIVE project, we have managed to complete this handbook in cooperation with teachers and pedagogical practitioners from around Europe. This gives a special international spirit, respecting different professional development stages of teachers.

During the writing process of this handbook, we combined field research with desk research. In February 2021, we organised an online Pan-European Conference on Digital Education devoted to the flipped classroom. Presenters from the FACTIVE project and schools showed six flipped classroom cases. Teachers from all educational levels contributed more than 42 poster presentations. 500 teachers participated in the live conference. The event gained 1.600 subsequent views in the first week after the conference. During the conference we also conducted a survey about the flipped classroom. 280 participants shared their experience with using and implementing the flipped classroom. We used the oral presentations, poster presentations, and survey results from the conference, combined with desk research, as input for writing this handbook. Once the draft version of the handbook was completed, additional feedback from partners helped create the final version.

International effort is what makes the flipped classroom handbook so rich in content yet easy to read and implement in every teaching practice.

CHAPTER 1

FLIPPED CLASSROOM MYTHS AND FACTS

1.1 FLIPPED CLASSROOM IS YOUR TOOL FOR STUDENT ENGAGEMENT

We live in a dynamic world in which knowledge is accessible within a few clicks. Competencies needed for a successful and happy life are changing rapidly. People change their careers, lifestyles, even countries. Learning today is more important than ever. We live in a world with too much information, a lack of structure, and infinitive possibilities. We need competencies such as critical thinking to deal with the vast amount of information we are exposed to, social skills to collaborate fruitfully with diverse people, and self-management mastery to put ideas into practice.

Teaching today is crucial, but the complexity of teaching is sometimes overwhelming. If we insist on ex cathedra, one-way teaching, we produce students with a lack of initiative, who aim at finding the easiest way to pass courses. Even if teachers lecture passionately and use the most interesting stories, the students who are exposed to teacher-centred teaching will find the gap between the demands in school and the demands in their current and future life will increase.

Drowned in a bundle of everyday tasks, we easily forget the bigger picture: both student and teacher want to succeed. Students want high-quality education. Teachers want to inspire their students. With this handbook, we aim to shed some light on the complexity of teaching in the 21st century. Discover the beauty of appreciative teaching using simple tools to engage your students into effective learning.

Yes, you read it right. Simple tools. The flipped classroom requires work and a high level of digital readiness, but we believe in small changes and collaboration when transforming the classroom. If everyone contributes, together we can co-create successful outcomes in the classroom. We wrote this book with teachers for teachers and have included answers to the most common questions posed by teachers regarding their role in the flipped classroom.

The flipped classroom is your ally when you think about student engagement. When we ask teachers what keeps them awake at night, they usually express their wish to know more about how to increase student engagement. It preoccupies teachers because student engagement in practice represents active learning, yielding better learning outcomes. So it is only logical that teachers want engaged students because engaged students are more likely to perform well on standardised tests and are less likely to drop out of school. When implemented properly the flipped classroom engages students, improves the quality of learning material, capitalises on the students existing knowledge, and shows students the value of knowledge for their current and future lives. The flipped classroom promotes interaction, teamwork, and real-world examples - all the things students want in their learning experience.

Figure 1. The flipped classroom increases student engagement.

"AS A TEACHER, FOCUS FIRST ON CREATING ENGAGEMENT AND THEN LOOK FOR STRUCTURES SUCH AS THE FLIPPED CLASSROOM, THAT CAN SUPPORT YOUR VISION."

Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

1.2 WHAT THE FLIPPED CLASSROOM IS AND IS NOT

European teachers most frequently enlist the following synonyms and associations connected with the flipped classroom: inverted, blended learning, student engagement, autonomy, reversed, mixed, upside down, hybrid, active learning, more student - less teacher, classroom with different activities, students' contribution, and interactive.

The figure below represents a traditional and flipped classroom. In a traditional classroom, the teacher instructs at school, and then the student completes assignments at home.

In a flipped classroom, the teacher facilitates student collaboration and problem solving at school. At home, students watch teacher instruction using different digital tools and videos and complete reading or some other type of learning activity. The word flipped implies the replacement of traditional schoolwork and homework. The school work becomes homework and vice versa. It involves the application of video lessons that students use as a source of knowledge in their homes. In school, students expand their knowledge through practical tasks.

TRADITIONAL CLASSROOM FLIPPED CLASSROOM
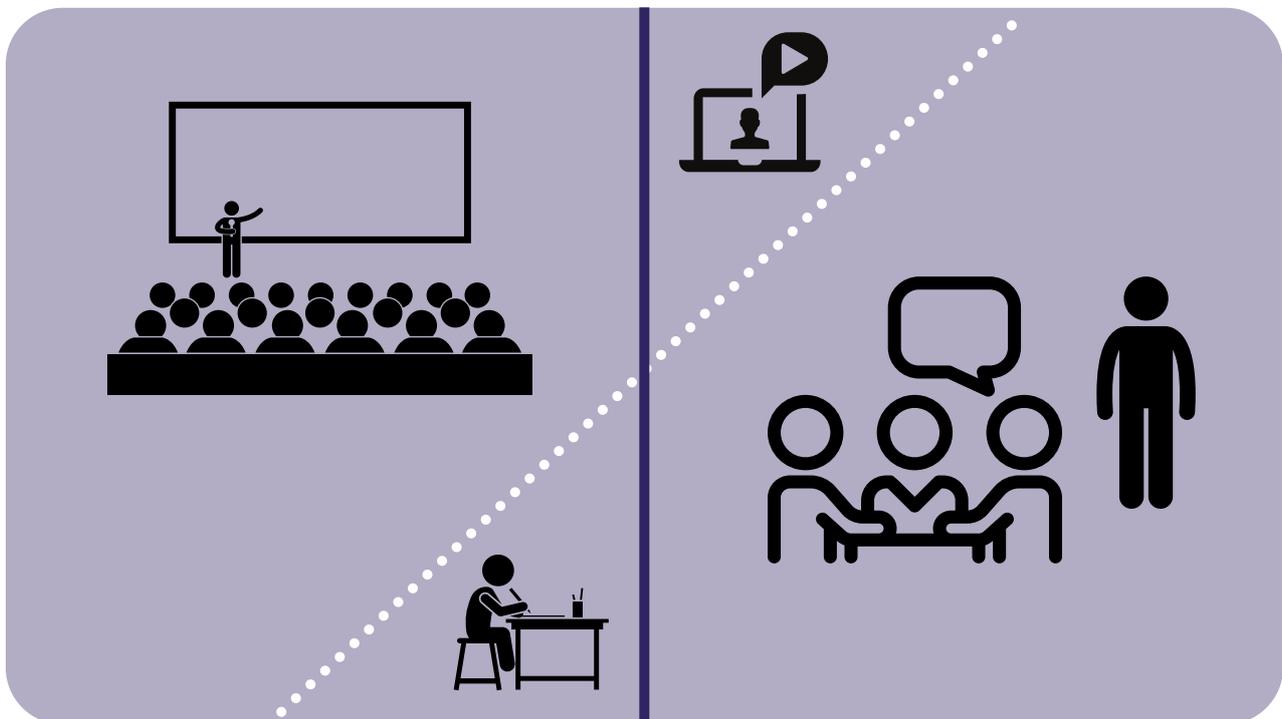
Figure 2. A traditional and flipped classroom.

The table below represents different definitions of a flipped classroom. Read the definitions. Draw a star to your favourite definition. When reading the definitions, consider how informative they are, and how many different perspectives they give on a flipped classroom.

Table 1. *Definitions of a flipped classroom*

Definition	How informative is the definition (1 - not at all, 5 - perfectly informative)?	How many different perspectives are shown by the definition (1 - only one, 5 - a lot of new perspectives)?	Draw a STAR (★) to your favourite definition.
The information-transmission component of a traditional lecture is moved out of class time and replaced by a range of interactive activities designed to entice active learning (Abeysekera & Dawson, 2015).			
The flipped classroom model redefines student-educator contact in the learning space. Direct instruction, traditionally in the form of a lecture, is moved from the group space to the individual space (Smallhorn, 2017).			
The flipped classroom is a set of pedagogical approaches that: • move most information-transmission teaching out of class • use class time for learning activities that are active and social and • require students to complete pre- and/or post-class activities to fully benefit from in-class work (Abeysekera & Dawson, 2015).			
In flipped learning, students learn via videos or multimedia learning materials prepared by the teacher before class. In the class, they are guided to engage in learning activities in which they apply knowledge with the assistance of the teacher or peers (Hwang & Chu, 2019).			

Definition	How informative is the definition (1 - not at all, 5 - perfectly informative)?	How many different perspectives are shown by the definition (1 - only one, 5 - a lot of new perspectives)?	Draw a STAR (★) to your favourite definition.
Flipped classroom approaches are characterized by: • a change in use of classroom time • a change in use of out-of-class time • doing activities traditionally considered 'homework' in class • doing activities traditionally considered as in-class work out of class • in-class activities that emphasise active learning, peer learning, problem-solving • pre-class activities • post-class activities and • use of technology, especially video (Abeysekera & Dawson, 2015).			
Flipping the classroom establishes a framework that ensures students receive a personalised education tailored to their individual needs (Bergman & Sams, 2012).			
The flipped classroom uses technology enhanced pre-class learning to transmit knowledge, incorporating in-class interaction to enhance higher cognitive learning (Chen et al, 2018)			
Video instruction in and of itself does not appear responsible for changes in learning performance, but may provide additional time for in-class activities that enhance learning performance due to active learning: audience response and open questions, pair-and-share activities, student presentations, discussion, and individual or paired quizzes (DeLozier & Rhodes, 2016).			

A flipped classroom is the place where student engagement is increased. However, knowing what a flipped classroom is will not guarantee its effectiveness. A flipped classroom is still not a fully-evidence based approach because of the diversity in its implementation.

Some implementations of a flipped classroom have improved student motivation, engagement, and learning outcomes. But, some implementations have not shown any differences between a traditional and a flipped classroom from the perspective of learning outcomes and student motivation. Equally important is knowing what a flipped classroom is and also being aware of what it is not. By knowing what a flipped classroom is not, a teacher will be much more likely to implement it successfully in their teaching practice.

A flipped classroom does not just assign YouTube videos to students.

Students might perceive external video resources as additional learning material and not as an integral part of the course. Consequently, students may not study them in as much detail as they need to in order to achieve the same learning outcomes as they would listening to their teacher. Also, it is not certain whether students actually watch the online resources, or merely open the resources and allow them to play while completing other tasks, either online or offline. If you use external resources, choose them wisely, and only use high quality content.

A flipped classroom is not equal to student autonomy.

Student autonomy cannot be taken for granted by teachers. Independence does not mean teachers can run away from teaching by pre-recording videos and expecting students to learn on their own. Often, students are so used to the teaching style of their teacher that they can hardly make sense of their lessons until they learn it directly from their teacher.

A flipped classroom is not only about watching videos before class.

A flipped classroom can be simply reading different materials, making presentations, quizzes, interacting with digital resources (with or without video) or even a whole range of non-technological flipped activities such as fieldwork, field trips, interviews, etc. An important difference between the flipped classroom and the traditional classroom is when the students learn theory and when the students do practice exercise. In a traditional classroom setting students learn theory in the classroom, whereas practice exercises are done as homework. In a flipped classroom students learn theory outside the classroom, and practice within the classroom.

A flipped classroom is not a debate club.

Teachers who assign videos, which must be watched before class, followed by group discussions in the classroom, will quickly find that students need structured and problem-based tasks to benefit from the flipped approach. A strong connection between before-class and in-class activities is needed. The connection also needs to be made clear by the teacher.

STEP INTO THE SHOES OF A TEACHER IN A CLASSROOM DURING THE 15TH CENTURY.

Dr Ulrich Eisenstein, a progressive Latin language teacher at the Heidelberg University, is one of the best professors in his field. Students appreciate his vivid teaching style, always presenting new perspectives. His friend Johannes Gutenberg, a prominent inventor, wrote him an exciting letter. He invented a mechanical movable-type printing press. "Just imagine, my dear friend," Johannes wrote, "Each and every one of your students will be able to get their own book. They will study at home so your teaching will be much easier." As excited as Ulrich is, he wants to try immediately how owning books will change his students' learning outcomes. He kindly requests that Johannes Gutenberg send him copies of Ars Minor, a schoolbook on Latin grammar. Each student gets a copy. For every lecture, Ulrich assigns them a chapter in the book to read as preparation for class. Ulrich expects lively discussions during class since the students will have gained so much knowledge in advance. After 3 months Ulrich is so disappointed that he wants to quit his position at the university.

Figure 3. The first flipped classroom in the world. Source: Alamy

WHAT WENT WRONG? WHAT WOULD YOU RECOMMEND ULRICH DO TO PUT THE ADVANTAGES OF HAVING A BOOK AS A STUDY RESOURCE INTO PRACTICE?

HOW DOES THIS PROBLEM RELATE TO 21ST CENTURY TEACHING PROBLEMS AND THE FLIPPED CLASSROOMS?

"I use documentation sheets, videos and job descriptions to carry out projects, which students receive as homework, then in class we check, debate, and complete and compare the results of their independent work which was done at home."

Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

Students can gain more autonomy through online collaboration. Access to digital technologies and their use can help reduce the learning gap between students coming from favoured socio-economic backgrounds and those from more disadvantaged backgrounds.

1.3 SWOT ANALYSIS OF THE FLIPPED CLASSROOM

Despite the advantages of a flipped classroom, we need to consider the whole picture. The SWOT analysis below shows some of the strengths, weaknesses, opportunities and threats (SWOT) of a flipped classroom. A flipped classroom is a tool, and every tool needs a skilled teacher to use it. Consider the following example. With the help of a hammer, we can hang a picture on a wall, but with that same hammer we can cause a lot of damage to an item. In other words, a hammer can be used as a tool that aids us or as a tool that can cause harm- it's purpose needs to be clear before it is used. SWOT analysis serves as a device to help people see the different perspectives of a flipped classroom. SWOT analysis does not provide final solutions, but it does provide important information on people's opinions and perspectives. Student autonomy is for some an advantage, whereas for others a disadvantage.

Table 2. *SWOT analysis of the flipped classroom*

STRENGTHS

- Flexibility, experimentation
- Improved student engagement
- More time for teacher-student and student-student interaction in class
- Students are more in control of their learning
- Increased sense of meaningful learning
- Possible to combine with gamification
- Students feel more prepared on the exam at the end of the course
- Students have to study as the course progresses and not just at the end
- Students get frequent feedback
- Learning outcomes are better if the flipped classroom is successfully implemented
- Appropriate for different learning needs
- Scaffolding: topics can be broken into several subtopics which make learning easier

WEAKNESSES

- Diversity of flipped classroom implementations causes a lack of scientific evidence about its effectiveness
- Time consuming for teachers, also students perceive it as time consuming
- Difficult for students with lack of autonomy
- Lack of digital skills, both those of teachers and students
- A lot of planning and designing of the course
- Additional competencies required from teachers
- If students skip online activities, they may find it difficult to follow in-class activities: these activities often lose their effectiveness and may result in some students being left behind
- A flipped classroom requires access to technology, some of the tools are for free, but some of them are very expensive

OPPORTUNITIES

- More opportunities to motivate students with a combination of different activities
- Part-time students who work have better learning opportunities with a flipped classroom because they do not have to skip classes so often
- Easier to implement cross-curriculum projects and/or combine different subjects
- Learning material can be used in different courses
- Opportunities to invite other experts during class time. Students are ready to ask questions because they were exposed to learning material before
- Teachers increased their digital skills during the pandemic, which they can use and therefore more easily implement the flipped classroom
- Improving time management and planning skills in the long run
- Balancing diverse learning needs is easier when students are exposed to different information input which is the case in the flipped classroom
- With a flipped method it is possible to change the whole school culture if school management along with the majority of teachers decide to implement it
- A flipped classroom is also an opportunity to integrate non-technological flipped activities with students' field work

THREATS

- Overwhelming technology: technology has to be as simple as possible so that it doesn't become a barrier for both teacher and student. The teacher has to start with what they feel comfortable
- A plan for implementing a flipped classroom that is too ambitious at the beginning may demotivate both teachers and students. Implementation needs to be gradual
- Lack of parental support at the beginning, because parents also do not know the flipped classroom approach
- Students might feel they have to work more
- Teachers might perceive the flipped classroom as something out of their comfort zone. The flipped method requires a change in the teacher's role which in some cases is connected with teaching identity. The teacher is more a moderator than lecturer
- Students with lack of access to internet and a computer are at a disadvantage
- Lack of commitment from school management or other teachers might discourage a teacher to implement a flipped approach
- Lack of high-quality teaching resources
- Increased screen time for students

1.4 WHAT EUROPEAN VET EXPERTS ARE SAYING ABOUT THE FLIPPED CLASSROOM

The FACTIVE project can rely on a solid foundation, in the form of a survey of companies and VET experts.

We wanted to make a sensible choice of the competence domains on which we would work. The choice fell on sustainability and circularity, clearly one of the biggest challenges for the European textile and clothing industries today, according to more than 100 employers we polled. For more details, we refer to the research report that you can download from the project website.

During the course of the project, we will work with various VET experts, among others to test and fine-tune the training materials. A training cycle on circularity in the textile and clothing sector is being tested in all partner countries of the FACTIVE consortium in parallel with the publication of this report.

In the context of the project foundation, VET experts were also surveyed, in addition to the companies. In this survey we discussed the FACTIVE methodology, the flipped classroom in particular. 47 VET experts gave us their insights. These VET experts usually have some experience with active learning methods (7 out of 10) or knowledge of the methodologies (8 out of 10) and are therefore well placed to share their experiences. Based on the opinion of

these experts, we can outline the added value of the flipped classroom methodology.

We see that various advantages of the methodology are endorsed, which can only lead us to the conclusion that the flipped classroom is preferable to classical knowledge transfer.

But at the same time, we also see that there is an important condition for achieving a successful training program, and that is the motivation of the students. Moreover, a lack of student motivation is cited by the same group of VET experts as the main issue related to demand-oriented training methods. It is presented as a condition sine qua non, in addition to the necessity to prepare the training thoroughly as a trainer and to free up time and energy for this. Indeed, a successful flipped classroom requires a two-sided commitment, but if it is present, there are only benefits.

In any case, the lack of motivation among students is a handicap in all educational contexts. But with the right information and guidance, a sensible selection of students based on the required prior knowledge and a clear focus on the finality of the training, motivation is never far away, even if it remains a working point.

1.5 WHAT EUROPEAN TEACHERS ARE SAYING ABOUT THE FLIPPED CLASSROOM

This handbook represents the voice of several hundred European teachers. 281 teachers contributed to a survey about the flipped classroom which we conducted during the Pan-European Conference on Digital Education in February 2021. In the analysis of the survey we collected the most frequent answers to questions about the flipped classroom.

What are the synonyms of the flipped classroom?
- Inverted
- Blended learning
- Student engagement, autonomy

What are the advantages of the flipped classroom?
- Extra time to practice in the classroom
- Students gain control over the learning process
- Open access to class material
- Personalized lesson plan
- Flexibility

What are the disadvantages of the flipped classroom?
- The time needed to make high-quality videos
- Finding the best resources
- Making sure students did their part at home
- Planning in-class discussions
- Reinventing myself as a teacher

Which flipped classroom activities do you use in your practice?
- Asking students to read something
- Giving students YouTube videos
- Open discussions
- Demonstration focused flipped classroom
- Project work

Which flipped classroom activities are the most effective in your practice?
- Videos with exercises solved and explained
- Real-life assignments
- Practice and answering students questions about what they haven't understood
- Games
- Project work

Which flipped classroom activities are the least effective in your practice?
- Students do not like to learn in advance
- Reading texts
- Giving only written instructions for the work at home
- Lessons on YouTube
- New material that is not connected with students previous knowledge

What is your advice to other teachers when implementing the flipped classroom in your practice?
- Stop controlling your students
- Step aside and allow the students to learn from each other
- Begin with one or two lessons and evaluate the results as you go
- Carefully plan all the tasks
- Focus on creating engagement and then look at structures that can support this

What are the best tools and apps for the flipped classroom? (The list below is from the most frequent to the least frequent answer.)
- EdPuzzle
- Liveworksheets
- Videos recorded by a teacher
- Quizzizz
- Nearpod
- Padlet
- Canva
- Flipgrid
- Loom
- Screencast-O-Matic
- Kahoot

Note that on the list above, videos made by teachers are in third place! Students trust their teachers. Sooner or later teachers become aware of that. Combining this with the time used to find the best external learning resources has led teachers to realise recording their own videos is often the best answer in a flipped classroom. When teachers come to this conclusion on their own they eagerly start recording their own videos. But if we say to them that in the flipped classroom it is expected from the teacher to record their own video lessons, teachers are reluctant and feel a great deal of resistance toward the flipped classroom.

Implementation of the flipped classroom comes with many dilemmas. In the table below you can find answers to the most common questions teachers have. For more inspiration on how to implement the flipped classroom see the following chapters. We will show three different approaches to the implementation of the flipped classroom. Choose your own combination with respect to your current professional development phase, digital competence, motivation, and students' needs.

Table 3. *Problems and solutions to dilemmas in the flipped classroom*

Problem	Solutions
How can I ensure that students actually watch the videos?	Before watching the video, the teacher should prepare a problem solving activity to be done in class. This will help students understand the type of activity they will be given after watching the video. Prepare a worksheet which the students must complete while watching the video. Note: The problem-based activities need to highlight how important it is to watch the video in advance.
I think that the flipped classroom is appropriate only for students in higher grades.	This is one of the most frequent concerns, which has been disproven by research. From the three proposed models of a flipped classroom (Moon, Mars, Jupiter) select a combination which will work in your teaching practice. Start with activities which are appropriate for less autonomous students, gradually include activities which require more autonomy from your students. The flipped classroom is a process. If your students are less autonomous today, it does not mean they will remain like this throughout the school year.
I don't know how to make videos, and I do not have the equipment.	If you start with perfection in mind, it will paralyse your creative process and you will struggle to begin. Remember, the goal of creating video content is not to create the perfect video, it is to create a video that teaches something. Equipment can be very basic like your webcam and you can always use free online software. More important than the equipment is to have a growth mindset and learn from your mistakes and the whole process.
Can I assign more videos to my students?	Yes, but not more than 15 minutes at once. You can for instance assign 3 videos, 5 minutes each. Keep in mind that students have to complete activities and not just watch the videos. Also, some students will need more time to watch the video(s) because they will stop, pause and re-watch some parts.

Problem	Solutions
My students do not like watching the videos.	Read this handbook carefully and choose the right model for your students. The lesson design is crucial in the flipped classroom. Bear in mind that a video has to be an integral part of the learning experience. Strongly connected with learning activities is the use of video. Lesson plans need to include video in such a way that understanding the topic without learning from the material in a video is difficult. Rome was not built in a day. Your students will need some time to adapt to the flipped model. Persist and give students enough time to get used to it.
Can I use different MOOC platforms like Udemy or Coursera?	Sure. All open educational resources are useful in flipped learning. Combine open educational resources with your own videos. Do not use external videos as the most frequent way of flipped learning. Since MOOC platforms provide structured courses, you will probably use only one or two videos from the whole course.
What license do I need to use videos? Are there any legal requirements?	Always cite the resource. Since education is a non-commercial activity you can use all open resources. If the resource requires a payment or subscription, you cannot use it without paying. You must use a lawful copy of the works (e.g. a movie you purchased legitimately). When creating a video you have the right as the creator to have your work protected with copyright. You can also give your own content a Creative Commons license.

1.6 LITERATURE REVIEW OF THE FLIPPED CLASSROOM IN FASHION EDUCATION

To gain a better understanding of how flipped learning has been adopted so far in Textile, Clothing and Fashion education, we conducted a review of the available literature on this subject. The research was conducted in renowned journal databases: Scopus, IEEE-Xplore, Science Direct, Scholar.

A total of 30 articles were found in this first stage of the research. Two researchers separately analysed the title, the abstract and the keywords of each article to identify the relevant ones, according to the inclusion/exclusion criteria presented in table below.

Table 4. *Inclusion and exclusion criteria*

INCLUSION CRITERIA	EXCLUSION CRITERIA
Scientific journals and conference papers	The paper is not in English
The paper discusses a case study related to the adoption of the flipped learning methodology in the fashion/textile educational domain	The paper is a systematic mapping study or a systematic literature review
	Articles are the same but from a different journal database
	The paper is not available for reading or download

Based on the literature review, it is clear that The Flipped Classroom methodology is increasingly being used in courses and education levels of any kind. However, our research has underlined that there is a limited number of studies in which this method has been applied to in the subjects related to Textile, Clothing and Fashion education.

Overview of selected studies

The courses where the Flipped Classroom was adopted vary from study to study. Given that we focused only on studies relevant to the Textile and Clothing industry, the subjects can be summarised in the table below.

Table 5. *Courses where the Flipped Classroom was applied*

STUDY	SUBJECT OF THE COURSE
Gupta (2020)	Fashion Design
Akuamoah-Boateng & Essel (2021)	Textile weaving class
Chatelain (2019)	Introductory apparel
Dixon (2018)	Apparel Construction and Evaluation 1
Dove (2020)	Designing and creating skirt Designing and creating trousers
Hasty (2015)	Visual merchandising course Brand management course
Jiang (2017)	Computer Aided Clothing Drawing
Lavelle (2018)	Management and Control of Textile and Apparel Systems course
Nikitina et al (2021)	Prototyping of complex shapes of clothes
Tao (2019)	Clothing Brand Identification
Ting (2019)	Clothing Design
Zhang & Zhang (2019)	New Technology of Apparel Digitalization

It is interesting to note that the types of subjects vary in a significant way, going from very basic and theoretical ones to more specific and practical. The meaning behind this is that it is a very flexible method, adaptable to several different courses with different results.

Another significant observation is the one regarding the type of students. The addressed target of students for each study is presented in the table below.

Table 6. *Studies divided according to target students*

EDUCATION LEVEL	REFERENCES
High school	Akuamoah-Boateng & Essel (2021)
University	Gupta (2020), Chatelain (2019), Dixon (2018), Hasty (2015), Jiang (2017), Lavelle (2018), and Nikitina et al (2021)
Post-college degree (master or similar)	Zhang & Zhang (2019)
Professional courses	Dove (2020), Tao (2019), and Ting (2019)

It is clear that the methodology has been applied at a university level in most of the studies examined. There is just one case in high school and at the post-college degree level, and three cases in professional courses.

Of course, the application at a high school level, or lower, could be problematic considering a certain degree of autonomy and self-discipline is required, which could be difficult to ask in underage students. As observed by Chatelain (2019), it would be helpful to provide students with an incentive to prepare for class.

Regarding the technological tools used in the flipped classes, in most cases video lessons were the preferred method to prepare the lectures that the students were going to watch before class. In most cases, the video lessons were uploaded on the official institution's website to make them easily available to everyone.

The videos were often integrated with other materials or resources like blogs, audio recordings, interactive exercises, wikis, studies, but also paper versions distributed in class.

Forums were used to improve students' interaction and facilitate the exchange of ideas and improve peer learning.

Gupta (2020) used video lessons also as video demonstration of practical aspects of the course. For example, video can be used to show how to set a sewing machine and explain its parts or how stitches should be made.

Dixon (2018) mentioned the use of Blackboard, a learning management system, to match the course schedule and help the students organise the daily objectives and related materials for the self-study part of the class. Also, Zhang & Zhang (2017) mentioned the use of an existing teaching platform previously used by the institution in their courses.

In at least one study (Nikitina et al, 2019), Moodle was previously used with the traditional method of teaching, and it was also the platform where the Flipped Classroom was implemented. It was possible to analyse the statistics pre- and post- implementation, making a comparison between the two methods.

It is important to note that many courses listed request to develop practical skills or IT knowledge applied in fashion.

This means that in addition to the technical tools typical of the Flipped Classroom Method (devices to watch video lessons, computers to use resources online, etc.), other tools and

equipment were required like: mannequins, sewing machines, dress-forms, fabrics, sketch books, a loom, and so on.

All articles that, usually, are available only during classes and, often, need an instructor to learn at least the basis.

Also, for some courses, like "Computer-Aided Clothing Drawing" (Jiang, 2017), dedicated software, like Coreldraw, Photoshop and Illustrator, were needed, because the entire course focused on learning their use.

In at least one case (Hasty, 2015), the teacher decided to teach one course with a technological aid, and the other without a technological aid. In this second case, the flipping was realised by assigning reading materials from a textbook or journal article and then, completing a worksheet.

This is an interesting comparison and allowed the researcher to understand if a flipped classroom in the absence of technological support can work as well, and what the feedback was.

Benefits and risks of adopting Flipped Learning on Fashion, Textile and Clothing Education

In the studies analysed, several benefits of the Flipped Classroom method were observed. The most common one is that many students gave good feedback about the new method, especially the possibility to watch and re-watch the video lessons as many times as they needed, and the class activities where the interaction with others, group exercises and simulations.

An exception was Chatelain (2019) where the teacher flipped the entire course at first, but the students, while liking the hands-on activities and the projects, did not like the online lectures and preferred traditional in-class lectures. This pushed the teacher to adopt a hybrid approach, flipping only some parts of the course, resulting in better feedback from the students.

Overall, as observed Dove (2020), "video presentations allowed students to need less 1-1 assistance and being able to complete the tasks with a sense of satisfaction. [...] Students were able to achieve high results, not only in the learning curve but also their level of creativity".

One of the aspects recognised by the teachers is the positive learning environment in class, thanks to practical activities and group work that improved problem-solving and social skills, making learning more fun for students and even the teachers themselves.

Besides that, the possibility for teachers to watch activities in class gave them the chance to intervene in case of the need of a more personal and direct approach, to correct or help those students who showed difficulties.

Regarding the final performance of students, in many studies the statistics about the final exams or tests showed an overall improvement. However, Lavelle (2018) observed that "Statistically the flipped course was indifferent from the previous course structure as judged by a common final exam and student course evaluations", even if "students enjoyed the teamwork and group discussion of the Friday sessions, and overall thought this was an excellent course".

The many potential benefits of the Flipped Learning approach should not overshadow the inevitable risks that this new method could entail. The main possible issue is given by the difficulties to adapt to this new method for both students and teachers.

For example, as observed by Chatelain (2019), where students did not like the "online lectures that they were required to watch", if students do not prepare for lessons prior to class, the entire flipped classroom idea falls apart.

Uncooperative students risk being left behind. One solution to this would be to find incentives to encourage students to prepare for class.

At the same time, this approach needs a very accurate preparation by the teacher, not just on the materials, but also about how the method works and some creativity on how to adapt the concept of Flipped Learning to the subject taught. Activities need constant adjustment because it is true that materials prepared can be reused over and over again, but they should also be constantly updated and improved.

Drivers/barriers to the adoption of Flipped Learning in Textile, Clothing and Fashion education

The main point in all studies examined was to find an alternative method of teaching Fashion and Textile subjects to improve the overall quality of courses and learning efficiency of students.

The Flipped Classroom method is strongly learner-centred. It focuses on self-study and autonomy, on one side, and cooperation, and hands-on and practical learning, on the other. The continuous hands-on approach brought a visible improvement in critical thinking.

Students are put in a situation where they can constantly improve themselves, not just by having the chance to watch the video-lessons, or other materials, as many times as they want, but also thanks to the constant opportunity to apply what they learned in class, with other students and the teacher always available to correct and guide.

Another reason for the adoption of this method is that many researchers have observed that the teaching experience is much more enjoyable for the teachers, with an improved efficiency and effectiveness.

One observation was made, where the teacher noticed a reduced time in class for the classic

explanation/demonstration, with more time dedicated to apply the techniques in a group assignment or practical exercises, with beneficial effects on the students (Dixon, 2018). In this way the real focus in class is on skill development, with the assistance of the instructor that can immediately address all students doubts and needs.

One important point is the flexibility of this method. As we pointed out, Flipped Learning was used in very different subjects related to the Textile and Clothing industry.

In a study by Nikitina et al (2021), flexibility was emphasised as a key advantage, as students were able to access course material always, no matter the time of day. If students missed a key point in a lecture, or missed a week of classes due to illness, they could log on and learn at their convenience.

Some of the examined studies highlighted that the use of a Flipped Classroom may entail difficulties that could prevent its implementation.

Flipped Learning has been applied in most cases with the support of technology. This means that its use is mostly bound to the use of IT and it is assumed that each student has complete and efficient access to a device and internet connection. This is a problem that is most relevant in a study by Akuamoah-Boateng & Essel (2021), where the method was applied in a high school class in Ghana, where the availability of devices, electricity and internet connection could be a problem, in particular in homes. This was mostly solved thanks to the presence, in school, of a ITC Laboratory, where all students were able to use computers.

This aspect could be a problem not just in third-world countries, but also in areas of EU countries where internet connection is poor.

The same problem is pointed out by Lavelle (2018) where it is indicated that we should not assume that "each student has access to a connected device such as a computer, tablet or smartphone". Beside this, the digital literacy of the target should be considered in some situations.

Another possible barrier could be the fact that re-organising a course with a Flipped Classroom method is time-consuming and labour intensive for teachers, adding up to the classes held every week.

To this aspect is related the fact that materials should be prepared in the best way possible, with videos that cannot reflect the same method and duration of a frontal lecture. Video lessons should be adapted and integrate other resources to keep the level of attention as high as possible.

Students' responses could be another barrier to implementation. As examined before, the refusal to prepare for the lesson before class could impair the Flipped Classroom method. In the same way, a lack of motivation and discipline, and a refusal to accept change (from both students and teachers) could prevent its use.

Finally, one more problem to the use of a Flipped Learning method with the aid of technology could be the constant presence of technical issues and glitches, as pointed out by Gupta (2020).

CHAPTER

2

HOW TO FLIP YOUR
CLASSROOM

We prepared three ways of flipping a classroom called: Moon, Mars, and Jupiter. The complexity raises from Moon to Jupiter. The three ways will help you and your students become accustomed to a flipped classroom **gradually** in order to prevent technology overwhelming you. The three ways consider your and your students **psychological safety** when going out of your comfort zone. We have seen many cases in which an ambitious teacher wanted to implement a flipped classroom all at once with a bundle of digital tools and gamification elements. Their good intentions resulted in the burn-out of the teacher and unmotivated students, all because they wanted too much at once.

Moon, Mars and Jupiter are in fact advancing levels. Going to Mars means involving all the Moon elements, going to Jupiter means involving all the Moon and Mars elements. The journey from the Moon to Jupiter raises not only the complexity of lessons and level of learning but also in changing the role of the teacher.

Moon, Mars and Jupiter, on the other hand, do not limit you in any way. If you already use the flipped classroom in your teaching practice, you can freely jump directly into Jupiter. An important thing to note is that Moon, Mars, and Jupiter are models similar to the concept of **ideal gas in chemistry - they do not exist**. They rather represent a starting point for a teacher to think about the flipped classroom in their teaching practice. There are no best flipped classroom models here. It is up to each teacher to find the best solution given the profile of the students and each teacher's professional development stage.

> **"WHEN YOU FLIP YOUR CLASSROOM NOT EVERY SUBJECT NEEDS TO BE IN THIS FORM OF LEARNING. BEGIN WITH ONE OR TWO LESSONS AND EVALUATE THE RESULTS AS YOU GO."**
>
> Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

Table 7. *Characteristics of different types of flipped classroom features and models*

FEATURE	MOON	MARS	JUPITER
Technology	Open resources videos	Screen recording videos	Teacher / students on the screen video
Other digital tools	Presentation tools, search engines	Collaborating digital tools, quizzes	Games, content creation tools such as e-books, videos
Non-technological flipped activities	Reading	Interviews	Field work
In-class activities	Worksheets	Structured discussions, posters, tasks	Problem-based activities
Teacher actions	Tutoring	Moderating discussions	Encouraging self-initiative and inquiry, gamification
Student actions	Forming questions, answering questions	Problem solving, discussing	Designing, experimenting
Student collaboration	Pairs and small groups guided with questions	Pairs and small groups guided with a set of instructions	Pairs, small groups and the whole class creating new material
Bloom's Taxonomy Background	Remember, understand, apply	Apply, analyse, evaluate	Analyse, evaluate, create

"IT'S LIKE FACING LEARNING AND EXPERIENCING IT UPSIDE DOWN. IT'S LEARNING THE OTHER WAY ROUND- BEGINNING WITHIN A GROUP NOT INDIVIDUAL. IT'S LEARNING IN A REFRESHING WAY AND MOTIVATING EACH INDIVIDUAL THROUGH THE INVOLVEMENT OF OTHERS. IT'S CREATIVITY. IT'S GIVING LIFE TO LEARNING."

Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

CHAPTER 3

MOON FLIPPED CLASSROOM

3.1 MOON FLIPPED CLASSROOM STEP-BY-STEP

Definition: The Moon Flipped Classroom uses external digital and non-digital learning material as pre-class preparation followed by highly structured in-class activities.

STEP 1

Design a flipped lesson with a strong connection between pre-class and in-class activities

Sources of success:

- teach your students how to follow a video
- pre-class and in-class activities are strongly connected

STEP 2

Choose your video

STEP 3

Teach your students how to follow a video

STEP 4

Introduce home activities to your students
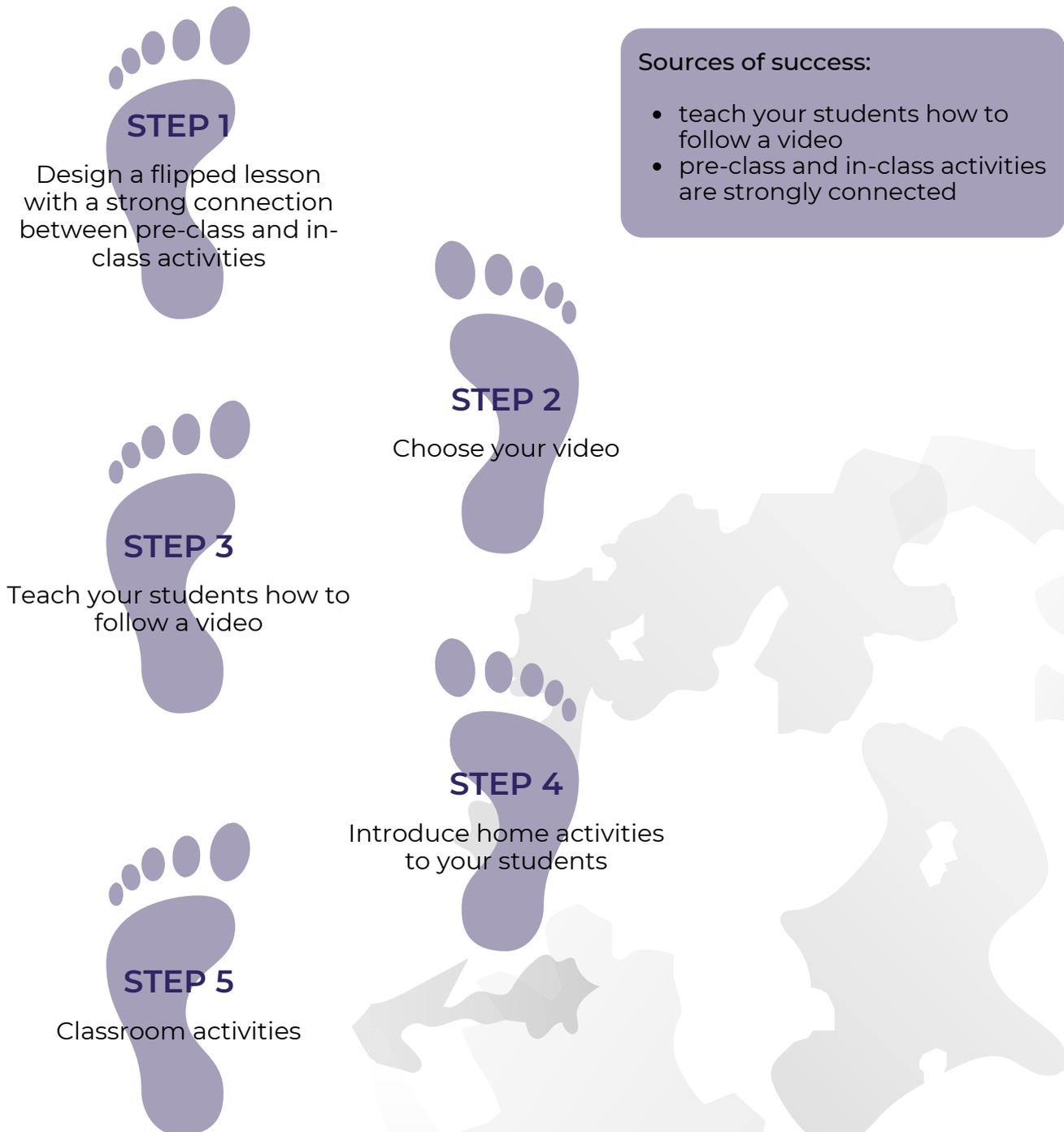
STEP 5

Classroom activities

Figure 4. Visualisation of the Moon Flipped Classroom.

Design a flipped lesson with a strong connection between pre-class and in-class activities

Simply assigning students videos to watch is not enough for a flipped classroom to be successful. Students tend to perceive videos as supplemental material and they often do not realise it is actually part of the curriculum. Also, giving only written instructions for their homework is not effective for the same reason. Establishing a strong and evident connection between home and class activities will design an integral learning experience in which students will see a desirable meaning.

Choose your video wisely

Most teachers teach multiple topics in one lecture, which is fine for live settings. In a flipped classroom there is a golden rule that we teach one and only one topic in a video. The attention span while watching videos is much shorter. By introducing more topics in one video we create confusion and decrease information retention.

The length of a video is also important. Flipped classroom experts recommend videos be a maximum of **15 minutes, preferably under 10** minutes (Bergmann & Sams, 2012). Longer videos decrease attention. If you have a long or full length video, choose 10 minutes from the video and assign students only a 10 minute interval within the whole video to watch.

> **"FLIPPED CLASSROOMS ARE NOT AS EFFECTIVE WHEN THE STUDENTS FIRST LEARN ABOUT A NEW SUBJECT AT HOME, ESPECIALLY NOT ONLINE, AND THEN HAVE DISCUSSIONS ON IT IN CLASS."**
>
> Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

Think also about the content of the video. Introducing a new topic with a video does not seem to be the right choice. Students hardly understand new topics from a video and they have difficulties making connections with existing knowledge. Choose a topic that is already familiar to your students.
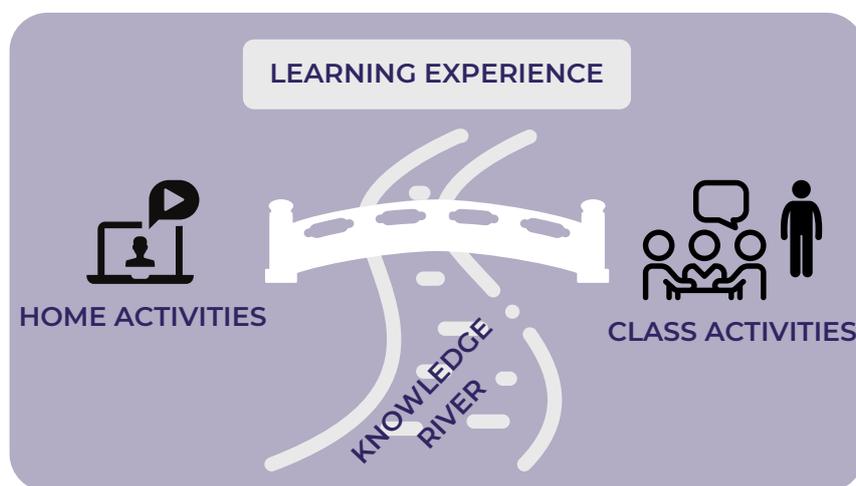
Figure 5. The connection between home and class activities is crucial to the success of the flipped classroom.

> **"THE MOST PRACTICAL VIDEOS ARE THE VIDEOS WITH EXERCISES SOLVED AND EXPLAINED BY OTHER STUDENTS OF MY STUDENTS' AGE OR BY OTHER TEACHERS. THEY CAN BE RESUMED OR STOPPED DURING THE PRESENTATION TO PROVIDE ADDITIONAL EXPLANATIONS."**
>
> Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

Prepare worksheets for your students

Flipping your classroom is not a new experience only for you. It is a new experience also for your students. At the beginning they will not be used to this kind of work so they will need a little help from your side. In the Moon model of the flipped classroom we recommend worksheets for your students in order to give them structure for their home activities. They will follow the videos easier with a worksheet in front of them.

The best way is to create your own worksheets, but you can also use some existing worksheets from Liveworksheets. Liveworksheets allows you to transform your traditional printable worksheets (doc, pdf, jpg…) into interactive online exercises with self-correction. Students can do the worksheets online and send their answers to the teacher.

An alternative to worksheets is quizzes. Obviously, worksheets and quizzes can include questions. Here we have in mind questions in the form of open questions. The idea is to assign a particular video to the students and give them no more than 3 to 4 accompanying questions as a source of brainstorming and learning from the video. When designing these 3 to 4 questions it is important to have in mind Bloom's taxonomy (1956) and design questions which reflect **different** levels of educational goals. If we focus our questions only on one level, students will be limited with their thinking about the topic.

Figure 6 is a reminder about Bloom's taxonomy with verbs you can use when forming the questions.

1 KNOWLEDGE	2 UNDERSTAND	3 APPLY	4 ANALYZE	5 EVALUATE	6 CREATE
Define,	Summarise,	Solve,	Contrast,	Criticise,	Design,
Identify,	Interpret,	Change,	Connect,	Reframe,	Modify,
Describe,	Classify,	Relate,	Relate,	Judge,	Role-Play,
Recognize,	Compare,	Complete,	Devise,	Defend,	Develop,
Tell,	Contrast,	Use,	Correlate,	Appraise,	Rewrite,
Explain,	Infer,	Sketch,	Illustrate,	Value,	Pivot,
Recite,	Relate,	Teach,	Distill,	Prioritise,	Create,
Memorize,	Extract,	Articulate,	Conclude,	Plan,	Collaborate,
Ilustrate,	Paraphrase,	Discover,	Categorise,	Grade,	Invent,
Quote	Cite	Transfer	Take Apart	Evaluate	Write

Figure 6. Examples Of Bloom's Taxonomy Power Verbs. Source: https://www.teachthought.com/critical-thinking/249-blooms-taxonomy-verbs-for-critical-thinking/

Quizzes are also popular among students. Like worksheets, you can develop your own quiz as a simple word document or use existing platforms such as Kahoot, Quizlet, etc.

When students become more autonomous, you can skip worksheets and ask them only to take notes using the **Cornell note taking method** (see below on page 38). When first starting to implement a flipped classroom we use methods which require a low degree of autonomy from students. Later, we introduce less structured methods where students have to be more autonomous.

Introduce home activities to your students

Use at least 5 minutes to explain home activities to your students. By explaining all the activities, including their purposes and goals, you make them an integral part of the learning process. You can also explain to the students the activities which will follow next time in the classroom so they will understand why it is so important to watch the videos at home and complete the assigned activities.

Arrange the accompanying methods for following the video from those methods which require a low degree of autonomy to those which require a high degree of autonomy.

METHODS: WORKSHEETS, NOTE TAKING, QUIZZES, ANSWERING OPEN QUESTIONS.

Low degree of self-autonomy required

High degree of self-autonomy required

Figure 7. Students engage with accompanying learning material when watching the video.

Teach your students to follow a video

So important, but often omitted. In a century of digital nomads you might think following a video is obvious to your students, but it is not. Students watch Tik-Tok videos and Instagram posts which is far from intensive learning. There is a difference between passively watching something for entertainment and engaging or interacting with an instructional video. Students have to learn how to watch educational videos. We need to explicitly teach students to learn from videos. Devote a special session on learning from videos before implementing the flipped classroom.

Before watching a video get your learning space ready. Turn off any devices, and remove distractions to become more focused on learning. Especially avoid social media, tv and phone notifications. Prepare a notebook to engage your brain in active learning. If you just passively watch the video, your brain will reluctantly follow and you will not retain much information. Taking notes helps your brain build connections.

During the video, pause and rewind. Pause to take notes or digest what you heard. Rewind when you do not understand something. To increase comprehension, re-watch the video. New information needs time to sink in. Therefore, watching the content once or twice more will help you understand it better. Bergmann & Sams (2012) recommend the Cornell note taking method. Draw a line a couple centimetres from the bottom of the page. Then draw another line a couple of centimetres from the left side, to create three boxes. The largest section you use to take notes however you would like. The smaller left portion is for short reminders on what to specifically study later. The bottom section is where you write a summary of what you learned.

After the video, review your notes immediately. Engage in activities assigned by your teacher either after or while watching the video. Write questions for your teacher.
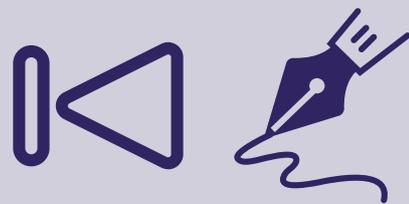
TIPS ON LEARNING FROM VIDEOS

BEFORE
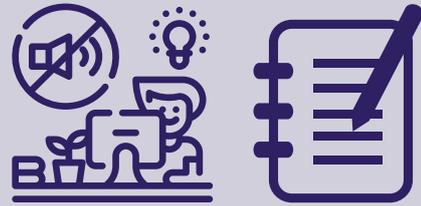
Remove distractions, prepare a notebook

DURING

Pause and rewind, take notes

AFTER

Review your notes, prepare questions

Figure 8. Tips on learning from videos.

NOTE TAKING TIPS

Write down key things and do not overdo it by trying to write every detail in the video.

Draw and visualise, use colours.

Use symbols and abbreviations.

Write questions for your teacher.

Figure 9. Notetaking tips.

A little bit about the **Cornell note taking method.** A student divides the page into three areas as shown below in Figure 10: two columns with a row across the bottom. The right column is the Note Taking Area. Take notes which are between 5 and 10 words in length. Use recognisable abbreviations and symbols. Write down important concepts, ideas, persons, formulas and graphs in the right-hand column. The left column represents the Cue Column. In the Cue Column write your questions, learning insights and ideas you get during your learning session. The bottom few centimetres of each page is reserved for a summary. Summarising the notes in the bottom row helps you to consolidate your understanding. This is best done immediately after the learning session. This also helps identify gaps in knowledge where students need further review or learning.
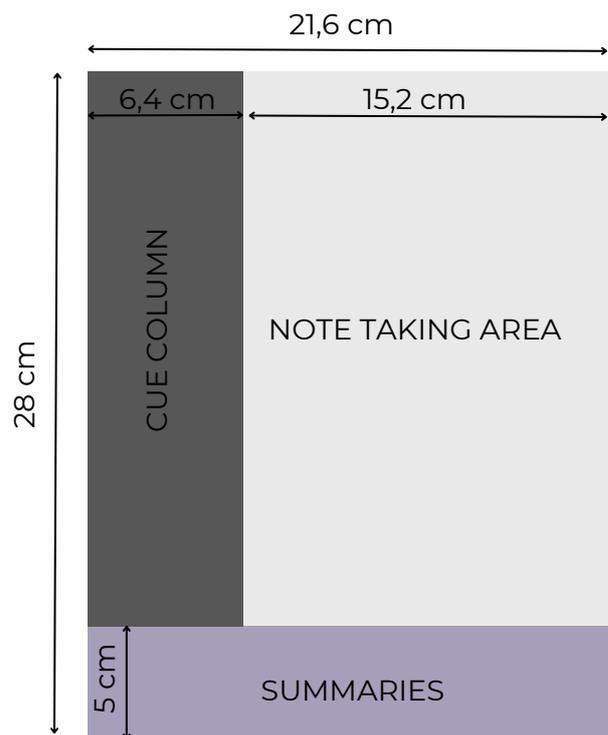
21,6 cm

6,4 cm — 15,2 cm

28 cm

CUE COLUMN

NOTE TAKING AREA

5 cm

SUMMARIES

Figure 10. Cornell note taking method.

Classroom activities

Using the Moon Flipped Classroom model is the simplest way to flipping your classroom and developing classroom activities. Prepare **worksheets and templates** using one of the platforms previously mentioned. This way you can devote your in-class time to tutoring your students, and to practical work and exercises. Minimise your time for lecturing.

Check in the resources chapter on page 92 to get teaching ideas for classroom activities.

The most important part of classroom time is to connect home activities with classroom activities. Never assign a home activity to students without discussing it during classroom time and connecting it with the activities in the classroom. Students will start to question the purpose of watching the videos at home if you explain and lecture everything in the classroom. They will start deciding when they have to watch a video at home and when they do not have to. To overcome this possible issue, you might start with an opening activity by asking students about what they learned at home. You can also start directly with worksheets. The worksheets should encourage students to use the knowledge they attained from their home activities. This will help students comprehend the topics in the learning process.

Low technology activities in a flipped classroom

When discussing the flipped classroom approach, we might get the feeling that it is only about using videos as a supplement for classroom lecturing. We could not be more wrong. Flipping is about putting more interaction into the classroom by learning the main concepts outside the classroom. Reading, field work, study visits, interviews, etc. can all be part of the flipped classroom. When these activities are properly introduced into the learning process, students understand them as being integral to the learning process and not just something without value.

In the Moon model we recommend reading activities or field work. Other low technology activities are more appropriate in the Mars and Jupiter models of the flipped classroom.

When we assign reading as a flipped classroom activity, follow the same process as described above. Choose short reading activities that last about 15 minutes, prepare a worksheet to use during reading, explain the worksheet to your students, teach them how to read the assignment, and also prepare worksheets for the classroom activities.

WHAT DO I WANT TO TEACH MY STUDENTS?

HOME ACTIVITIES

- [ ] Have I taught my students how to follow a video?

- [ ] How much time will the students need to complete the activity?

- [ ] Have I prepared a worksheet for the students?

- [ ] Have I planned to introduce and explain the home activities to students?

- [ ] Is the video a maximum of 15 minutes long (preferably under 10 minutes)?

- [ ] Is the video about one and only one topic?

CLASS ACTIVITIES

- [ ] Have I prepared an opening activity in order to discuss the home activities?

- [ ] Have I prepared a worksheet for class activities?

- [ ] Have I planned to explain the connection between home and class activities?

Figure 11. A Checklist to help you design a flipped classroom learning experience.

3.2 MOON FLIPPED CLASSROOM EXAMPLES

MOON FLIPPED CLASSROOM: EXAMPLE 1

Source: Helga Kraljik, English and German language teacher

Topic: Spotting fake news

Short presentation:

Students gain knowledge about fake news through online research, activities at home and activities at school. They learn how to spot fake news, and develop critical thinking skills.

Part 1
As preparation for the class, students do online research about fake news, and they learn how to spot this type of news. They create a checklist with criteria (a list of tips) for spotting fake news. Using these criteria, they find examples of fake news.

Part 2
During lessons, students present and compare their checklists with their classmates. They use their own checklists to evaluate examples of fake news from other students. They create a draft poster of their work. The poster can be physical or digital.

Part 3
As part of their work at home, students do online research and find real, truthful and secure sources of information. They then create a final version of their poster and prepare and deliver an oral presentation. Students can also record an audio presentation about their research and findings. Another option is to have the students prepare a video presentation.

Why is this activity a good practice example?
Students have more time for preparation and revision of their work – it encourages them to come to class prepared. It gives students more collaboration time in the classroom where they can learn from one another and consolidate or improve the knowledge they gained while learning at home. At home they can learn at their own pace and explore the subject more in-depth. Teachers can ensure that students better understand concepts through the use of practical applications.

MOON FLIPPED CLASSROOM: EXAMPLE 2

Source: IVOC, Instituut Voor Vorming En Onderzoek In De Confectie – Institut Pour La Recherche Et L'enseignement Dans La Confection, www.ivoc.be

Topic: Teachers teach teachers in clothing technology

Short presentation:

How often do we hear the complaint that education is lagging behind industry developments? It seems impossible to keep up with the latest hard- and software, production processes and changing industrial standards. Why is that so, and who should do something about it?

In Belgium, fashion teachers are taking matters into their own hands. They do that by working together. They have created a network of teachers in clothing technology. These teachers exchange and compare their materials and insights with each other. They call on industry experts to help them fine-tune their resources and working methods. The teachers themselves are proactive and find answers to questions by contacting professionals in the industry.

The Belgian sectoral training center for the clothing sector IVOC has been coordinating this collaboration between industry experts and teachers for some 15 years now. More than 200 teachers still participate.

The result is a library of quality training materials tailored to industry standards. The materials are all used intensively in the education of the students. The teachers decide which materials they can use based on their assignments and the needs of their students.

Reach of teachers in the instruction cards project (IVOC, 2021)
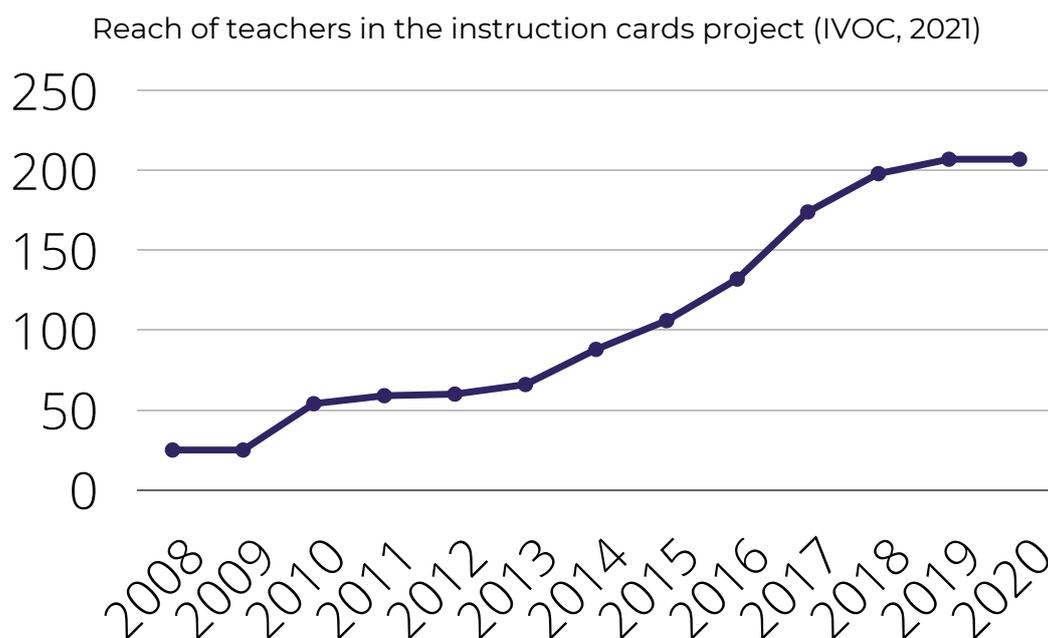
Figure 12. The number of teachers included in the network from the years 2008 to 2020.

Figure 13. Fashion teachers working together.
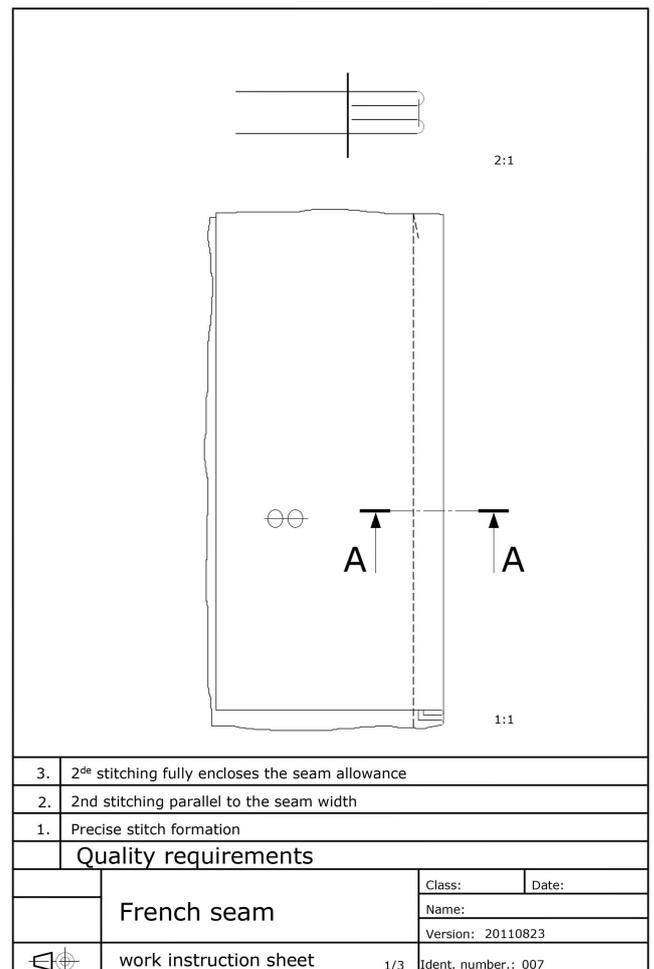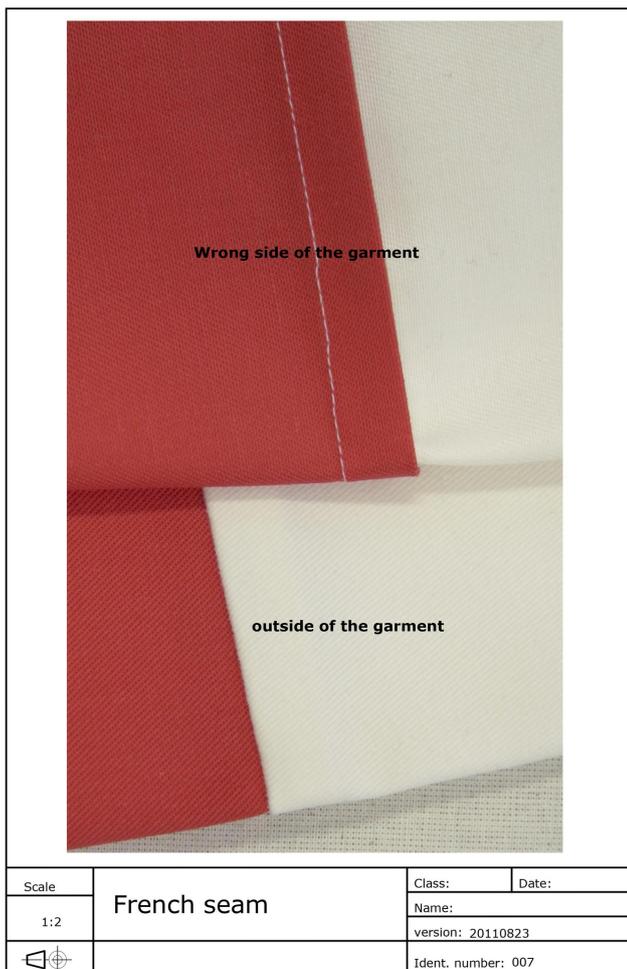
Scale	French seam	Class:	Date:
		Name:	
1:2		version: 20110823	
		Ident. number: 007	

Wrong side of the garment

outside of the garment

2:1

1:1

3.	2de stitching fully encloses the seam allowance
2.	2nd stitching parallel to the seam width
1.	Precise stitch formation
	Quality requirements

	French seam	Class:	Date:
		Name:	
		Version: 20110823	
	work instruction sheet 1/3	Ident. number.: 007	

A   A

Left sheet:

Extra information

2x seam allowance   2x seam allowance

Scale		Class:	Date:
1:2	French seam	Name:	
		version: 20110823	
	work instruction sheet 2/3	Ident. number: 007	

Right sheet:

	processing	
	1. stitching seam - place **reverse** side on **reverse** side (= inside) - edges even - sew a seam 1.5 mm smaller than the seam value	
	2. press the seam open - along the right side - seam flat & clean	
	3. stitch around the seam - fold right side over right side (= inside) - seam right on the edge - stitch at seam width - stitching completely encloses the seam allowance	

Scale		Class:	Date:
	French seam	Name:	
		version: 20110823	
	work instruction sheet 3/3	Ident. number: 007	

Figure 14. Example of an instruction card for assembling a garment.

Why is this activity a good practice example?

It is an excellent example showing how teachers can save time by cooperating and using teamwork. The teachers develop the learning material together. Later, they are able to incorporate the material in their own classrooms.

MOON FLIPPED CLASSROOM: EXAMPLE 3

Source: Sanja Jelaković Kühner, Italian and French language teacher

Topic: Learning about cities in foreign countries

Short presentation:

Students learn about different cities in foreign countries through online research. After, the students prepare audio and poster presentations. They can explore cities of the countries from which the languages they are learning originate. For example, if students are learning Italian, they research and present Italian cities. If they are learning German, they explore German cities. They develop creativity and critical thinking skills.

Part 1
As preparation for the class, students do online research of their chosen cities and make notes at home. They also do online research about signpost language and prepare phrases they will be able to use for their oral presentations.

Part 2
During a lesson students prepare the text/narration for the oral presentation and they are given time to practice their presentations. The teacher monitors their work, provides guidance and assistance, and gives feedback to the students.

Part 3
At home, students record audio presentations (e.g. using vocaroo.com) and design a digital poster with a QR code of the audio recording (e.g. using Canva) about their chosen cities.

Part 4
At school students print their posters (they can also do this at home if possible) and set up an exhibition in the school corridor(s). They also create an e-book with all the posters (e.g. using Canva). At the end, they do a peer assessment of their classmates' posters using the criteria/benchmark [J1] provided by the teacher.

Why is this activity a good practice example?
It encourages students to explore and engage with digital content at home. They come to the classroom prepared with ideas and questions. Students can access multiple sources and this diversity can increase their comprehension of the subject. The activity also encourages students' creativity and enables them to choose and critically assess the information they will use for their presentations. It gives the teacher more time to spend with each student. Students are active not only as learners, but also as peer-reviewers which gives them the opportunity to learn more, consolidate their knowledge and gain skills on providing feedback to their peers.

MOON FLIPPED CLASSROOM: EXAMPLE 4

Source: Bianca Crut, Math teacher

Topic: Indefinite integrals

Short presentation:

Students gain an understanding of the rules of integrals and the function of the primitives table. They learn how to calculate indefinite integrals and the formulas of elementary function primitives through practical examples.

Part 1
As preparation for the class, students watch a video that presents the linearity of the indefinite integral, the table of primitives of elementary functions, and some practical examples using formulas.

Part 2
During the lesson, which can be online, in the classroom or in both arenas where half of the class is in the classroom and the other half attends class online from home, the teacher presents one of the formulas from the table on the board.
Students work individually. Based on an example provided by the teacher, students verify 3 formulas from the table. These formulas are from the video and are chosen by the teacher.
Students then do the exercises from the first part of the worksheet. They are encouraged to ask questions and seek additional information that will help them understand the topic and exercises better. The teacher provides support and gives additional explanations and clarifications.

Part 3
As individual work, students do the exercises from the second part of the worksheet and then do the quiz prepared by the teacher using Quizziz.

Why is this activity a good practice example?
Students gain knowledge about indefinite integrals through video, teacher explanations and individual work (calculating tasks and a quiz). The explanation of the subject is given firstly in the video and later is also provided by the teacher, which strengthens the students understanding of the topic. When students watch or listen to the explanation at home (and they can do this several times if they have difficulties with understanding; they can also seek support from their parents), and then solve problems and apply the new knowledge they have gained during the lesson, they can get less frustrated with their homework. At home students can do the exercises at their own pace. During the lesson, students have the opportunity to ask additional questions and check directly with the teacher if the exercises are done correctly. Due to the fact that students are acquainted with the topic before the lesson, they can ask questions and get immediate targeted answers when they do not understand a new concept.

CHAPTER 4

MARS FLIPPED CLASSROOM

As attractive as the Moon flipped classroom is, it has one big disadvantage. A lot of external resources are available in English only, which can be a serious problem for students with low English language skills, special needs students, and students with low grades. Another major constraint is the use of too many external videos, which can result in a decline in students' motivation to learn. Therefore, it is important to consider the number of external resources within a given lesson.

The Mars flipped classroom model introduces screen recording videos prepared by a teacher. As such, it allows more flexibility to teaching because the learning material is tailor-made. The Mars model is especially effective when teaching maths, physics, or in VET when teaching how to cook, sew, etc. In class, teachers explain procedures only once. With the help of a video, students can rewind, forward, or stop the video until they understand the concepts better.

The Mars flipped classroom model is an upgrade of the Moon flipped classroom model. Everything valid for the Moon model also applies to the Mars model.

"

"FLIPPING SPEAKS THE LANGUAGE OF TODAY'S STUDENTS. FLIPPING ALLOWS FOR REAL DIFFERENTIATION. FLIPPING ALSO EDUCATES PARENTS."

Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

4.1 MARS FLIPPED CLASSROOM STEP-BY-STEP

Definition: The Mars flipped classroom uses digital and non-digital learning material made by the teacher as a pre-class preparation, followed by semi-structured in-class activities.

STEP 1

Design a Mars flipped classroom lesson

Sources of success:

- help students to extract conclusions out of the videos
- promote a growth mindset by showing different learning strategies

STEP 2

Make videos

STEP 3

Prepare pre-class and in-class activities

STEP 4

Deliver your plan and be persistent

STEP 5

Evaluate and reflect

Figure 15. Visualisation of the Mars Flipped Classroom.

Design a Mars flipped classroom lesson

Moving from the Moon model, not only do you now have scientific evidence, but you also have your own experience regarding how important it is to connect video, pre-class activities, and in-class activities to each other. By doing so, you design a holistic learning experience which students can digest in a meaningful manner.

The Mars flipped classroom anticipates higher Bloom's taxonomy levels, namely, apply, analyse, and evaluate. Lesson design follows accordingly to higher Bloom's levels. Activities require open questions such as how, compare, reflect. The teacher prepares problem solving tasks. Class time is devoted to discussions which are skilfully moderated by the teacher. Class time also involves practicing new skills.

Making videos

For the Mars flipped classroom you will need a presentation, microphone and screen recording software. These videos are digital video recordings of your computer screen and usually include audio narration. The screen recorder captures everything you show on your computer, including voice, annotations and slides. There are many free screen recording applications on the market such as Screencast-O-Matic, Loom, etc. (More apps can be found in the table of resources on page 92.)

Not all content is appropriate for screencast videos. The best content is short instructional videos that focus on teaching a single, narrow topic. Synonyms for these types of videos are **tutorials** and how-to videos. They represent a go-to instructional method for teaching a process or providing step-by-step instructions. Students benefit because they can watch the video as many times as they want until they fully comprehend the process.

The simplest way to prepare a presentation is to record a video by using screencast software. Start here if you are a beginner. Later with practice you can upgrade. Some platforms, such as Edpuzzle, allow you to combine your content with the platform's video library in order to meet the needs of your students.

When preparing a narrow topic, the video should be no longer than 10 minutes. Before recording, a script should be written. A script, even a simple one, will help you be efficient with what you say, saving you and your students time. You are also far less likely to forget something.

Characteristics of a good video:
- narrow topic
- only one topic per video
- explain what the video is about, and go straight to the topic,
- the maximum length of a video is 10 minutes, for younger students 4 to 6 minutes

Prepare pre-class and in-class activities

In contrast to the Moon flipped classroom model, the Mars flipped classroom model learning activities can be semi-structured if students are already used to the flipping model. If not, stick to fully structured material.

Teachers usually give students online research tasks or questions as an accompanying activity to videos. Do not limit yourself with a narrow selection of activities. After watching the videos, students can interview people (recommended in pairs in order to reduce anxiety), try field work, prepare a checklist followed by making observations, or conduct company visits.

Problem-based in-class activities require skilful moderation by using coaching and socratic questions in order to spark thinking. See the table below for resources you can use when thinking about how to structure in-class activities. Methods will bring participatory learning and collaboration into your class.

Deliver your plan and be persistent

Your students will probably need some time to adjust to a flipped model. Maybe they will even rebel at the beginning. Help them to see the value of video in learning. Promote a growth mindset in your classroom by testing and showing different learning strategies.

If students do not comprehend something or make a mistake, avoid labelling. Introduce a different learning strategy instead. Students with a growth mindset seek out better feedback, persist for longer, cope better with transitions and develop better self-regulation (Dweck, 2006). By promoting a growth mindset in your classroom you help your students to value effort, because they believe that they are capable of learning more challenging things.

Table 8. *Use interactive methods for in-class activities*

METHODS	SOURCE
Edward de Bono thinking tools	https://www.cortthinking.com/
Participatory learning methods	https://www.artofhosting.org/
Socratic questioning	http://problemsolving.engin.umich.edu/strategy/cthinking.htm
Coaching questions	https://www.edutopia.org/sites/default/files/resources/edutopia-stw-replicatingpbl-21stcacad-reflection-questions.pdf

FIXED MINDSET	GROWTH MINDSET
We have set doses of each quality.	The hand we're dealt is only a starting point.
There is a ceiling on how much we can achieve.	Our true potential is unknown and unknowable.
Not succeeding right away signals failure.	Setbacks are ideal opportunities for growth.
If I have to try, I must not be good enough.	Effort is what makes us smarter and better.
Criticism is a sign of inadequacy.	Feedback is a powerful vehicle for self-growth.

Figure 16. Growth mindset helps students to adopt flipped learning. Source: https://www.olipage.com/growth-mindset-examples/

Evaluate and reflect

If something does not work in your flipped teaching practice, learn from it. Avoid judging either yourself or your students. Applying the 4F method will make your reflection easier. 4F stands for Facts, Feelings, Findings, Future. Reflect from your perspective and from the perspective of your students. Use a worksheet below for your guided reflection.

Table 9. *Worksheet with 4F reflection*

TEACHER PERSPECTIVE	STUDENT PERSPECTIVE
What do I think about a new way of teaching students? What should I change? What did not turn out to be good? How will it be in the future?	What are students' attitudes towards hard work? Do they skip classes? How do students feel about the flipped classroom? How persistent are they in using the flipped model? Which values and virtues deserve our special attention/should we focus on?
Facts	Facts
Feelings	Feelings
Findings	Findings
Future	Future

3.2 MARS FLIPPED CLASSROOM EXAMPLES

MARS FLIPPED CLASSROOM: EXAMPLE 1

Source: Dragana Benić, History teacher

Topic: American civil war

Short presentation:

Students learn about the American civil war through video and a video lesson created by the teacher. At school and after the lesson, students consolidate their knowledge through individual and group work.

Part 1
As preparation for the class students watch a video and video lesson about the American civil war that the teacher has created using Moviemaker and EdPuzzle. The video lesson is interactive since students have to answer questions in order to watch the video to the end.

Part 2
During the lesson, the teacher first implements a short Kahoot quiz to check if the students have watched the video and gained knowledge about the American civil war. Group work follows where students address and discuss different topics related to American history (e.g. the issue of slavery in America, the fate of the American Indians, the "gold rush", etc.).

Part 3
The teacher creates a virtual Padlet board where students can ask additional questions related to the topic of the lesson. The teacher provides answers, and provides information about additional educational material.

Why is this activity a good practice example?
It encourages students to get engaged in learning through video, participate in individual and group work and come to class prepared. They can learn at their own pace at home and they have the opportunity to check their knowledge on several occasions (while they are watching the video, at the start and after the lesson). They can also learn through group discussion with their peers. It gives the teacher the opportunity to prepare quality and interactive educational material and also gives the teacher more time to address different topics in the classroom (that might not be addressed otherwise). Students can also ask questions or seek extra help after the lesson.

MARS FLIPPED CLASSROOM: EXAMPLE 2

Source: Žana Jermakovaitè, Economics teacher, and Fernando Antunez Cid, IT teacher

Topic: Euro coins (IT and Economics and Business lesson)

Short presentation:

Students learn about different Euro coin denominations through online research and analysis of reliable sources of information. Students work in small groups and use IT tools and skills to do online research and prepare a presentation.

Part 1
As preparation for the class, students watch an online video tutorial prepared by the teacher. This tutorial includes instructions for the students' work and learning process, as well as basic information about the topic of the lesson. Each group of students (groups can be formed by the teacher, students or a random draw) chooses one country in the Euro area for their research. They have to find 3 examples of different coin designs: the most popular coins in circulation, commemorative coins and low mintage coins. The students analyse these designs, and find out their meaning and connection to the country. Using a shared platform (e.g. Microsoft Teams) each group has to prepare a short PowerPoint presentation. Every presentation must include 4 elements: results of the online research and examples of the coins, a brief explanation about the meaning of the coins' different designs, a reference to the sources of information and a reflection about the results and also teamwork.

Part 2
Each group presents their findings at school. Students are encouraged to ask other groups questions about their work. They also have to complete a short questionnaire about the pros and cons of the presentation and the learning/working process.

Part 3
All presentations are published using an online tool like Padlet. Students are encouraged to comment and evaluate their own presentations; they are given guidelines that help them evaluate their work in a positive and constructive way. Critical positive thinking is encouraged. Every group of students also receives feedback from the teacher about different aspects of their learning process and results: technical, research, teamwork and presentation skills.

Why is this activity a good practice example?
It encourages students to explore the topic with other students, and at their own pace. Students strengthen their skills of not only online research, but also teamwork and communication. They can come to the classroom prepared and equipped with specific knowledge. Students can also access multiple sources. This diversity can increase their comprehension of the subject. The activity also enables them to choose and critically assess the information they will use for their presentations. It gives the teacher the opportunity to prepare quality and interactive educational material. The teacher also has more time to provide additional support and feedback to the students. Students are active not only as learners, but also as peer-reviewers which gives them the opportunity to learn more, consolidate their knowledge and gain skills on providing feedback to their peers.

MARS FLIPPED CLASSROOM: EXAMPLE 3

Source: Željka Winkler, History and Philosophy teacher

Topic: Holocaust Remembrance Day

Short presentation:

Students learn about the holocaust and reflect on the role and responsibilities of individuals, groups, and nations when addressing human rights violations and genocidal acts. They develop critical thinking related to propaganda, stereotypes and prejudices.

Part 1
As preparation for the class, students watch a video about Holocaust Remembrance Day prepared by the teacher. They think about the questions provided in advance by the teacher and draft their answers.

Questions:
1. What prejudices and stereotypes are attributed to Jews?
2. What flaws are attributed to Jews?
3. What are the examples of discrimination, human rights violations and violence that you find in these cartoons?
4. Compare this cartoon with the previous one. What happened before the call for violence?
5. Describe the restrictions a Jewish girl or boy faced on a daily basis during World War Two.
6. Investigate what happened to the Jews in Denmark.
7. Do research on who the "Righteous Among the Nations" are.

Part 2
During the lesson the students are divided into small groups. Each group discusses the questions related to the videos (students can use draft versions of their answers) and prepare a final answer to each question together. They present their answers on Padlet.

Part 3
At home, students do online research and present 2 cases of genocide present in the world today. They need to investigate what has happened and what the international community could have done to prevent it.

Why is this activity a good practice example?
It encourages students to get engaged in learning through video, and individual and group work. This activity also encourages students to come to class equipped with new knowledge and prepared for discussion. They can learn at their own pace at home as well as through group discussions with their peers. This gives them also the opportunity to reflect and discuss their own stereotypes and prejudices. The teacher can prepare quality and interesting educational material on difficult topics. There is more time to address the topic in-depth. In the classroom, students can ask additional questions and explore the topic in greater detail with the teacher.

MARS FLIPPED CLASSROOM: EXAMPLE 4

Source: FACTIVE Partnership

Topic: Transparency of clothing

Short presentation:

The basic principle is that circular business models are based on transparency with regard to (raw) materials used. Consistently, this is also the case for the effects of the use of products and what happens to end-of-life products. But transparency is often missing in non-circular business models. With this activity students raise their awareness of the importance of transparency in the clothing industry.

Part 1
At home students choose a random item of clothing and try to find out where the raw materials come from. The students should all work on the same item of clothing, for example a red T-shirt, because they must cooperate with one another and experiences must be recognisable / meaningfully exchanged. This research can simply be done via the internet and by looking up the item of clothing in web stores. Students then can then look for the origin of the raw materials used in the specifications of the product: which materials are used, what is the composition of the fabrics, by whom and where are they manufactured, how does the t-shirt get its red colour, which dyes were used, is it about sustainable materials, etc.

In many cases they will not find this information, unless they come across circular products. The most enterprising students will request the information from the seller via the contact button or on the chat. The teacher might even encourage them to contact the enterprise to find out more information about the transparency.

It might be a good idea to also register the price of all red t-shirts that are found and include it in the analyses.

In addition, students have to create either a digital or paper poster with their findings.

Part 2
In the classroom students prepare a poster session in which they present their major findings. The teacher leads a discussion on the importance of transparency and its consequences. The students can also take part in discussion groups around the following questions:

Group no 1: What are the major problems of the fashion industry with regards to sustainability?
Group no 2: Who is responsible for the sustainability of clothing and what are their actions?
Group no 3: What is greenwashing and how is it shown in the clothing industry?

After this discussion they can work in pairs or triads and brainstorm about possible solutions.

Why is this activity a good practice example?
Students not only raise their awareness of different aspects and consequences of transparency, but they also experience, through their own research, that transparency is a real problem.

CHAPTER

5

JUPITER FLIPPED
CLASSROOM

From Mars we travel to the Jupiter flipped classroom model, in which students are the most active in learning. The emphasis is on creation of new materials prepared by students. By creating new materials, students master the highest Bloom's taxonomy levels, namely analyse, evaluate, and create.

The role of the teacher in the Jupiter flipped classroom model encourages self-initiative and inquiry. The Flipped model is combined with gamification, integrated learning and project work. Videos are made by the teachers or students. We still want to keep it simple by using one camera only. The teacher is on the screen here.

You might be asking yourself why are screencast videos found under the Mars model and having the teacher on screen under the Jupiter model? This is a legitimate question since the focus in the Mars model is on semi-structured activities, whereas in the Jupiter model, the focus is on problem solving, designing, and experimenting activities. The explanation is simple. Working with teachers has shown us that the path out of a teacher's comfort zone is the longest if they have to record themselves. Teachers need a lot of practice with screencast videos before creating videos with themselves on the screen. This is not because of technology, but because of their psychological welfare. Technology is basically the same: web camera and microphone. It can even be a phone. But seeing yourself on video requires courage and an understanding that it is OK to make mistakes. Because of this, we put the videos of teachers on screen in the Jupiter model. In addition, this allows teachers to develop their skills gradually. We do not want teachers to feel that a flipped classroom is something overwhelming and too difficult for them to use.

5.1 JUPITER FLIPPED CLASSROOM STEP-BY-STEP

Definition: The Jupiter flipped classroom uses digital and non-digital learning material made by the teacher or students as a pre-class preparation for the lesson. This is then followed by open problem-based in-class learning activities.

Sources of success:

- focus on creating new material by students
- upgrade your moderating and facilitating skills

STEP 1

Design a Jupiter flipped classroom lesson

STEP 2

Make or delegate videos

STEP 3

Prepare innovation driven in-class activities

STEP 4

Encourage creation

STEP 5

Guide student reflection

"THE GREATEST BARRIER FOR ME IN FLIPPING THE CLASSROOM WAS THE PROCESS OF THE REIMAGINING OF TEACHING AND LEARNING, TO BECOME MORE LIKE A MODERATOR THAN A TEACHER WHO ONLY DELIVERS LECTURES."

Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

Figure 17. Visualisation of the Jupiter flipped classroom model.

Design a Jupiter flipped classroom lesson

The Jupiter model is appropriate when students and teachers have already had various flipped classroom sessions. This is not because of technological difficulties but because the Jupiter model requires the greatest change in a teacher's attitude. Teachers need to change their mindset from teaching to facilitating. Just a reminder that the use of technology can remain simple in the Jupiter flipped model.

In designing your session, focus on the goal that students will have to create something new like a text, video, model, item, software, book, etc. Allocate enough time and space for creation. Prepare open and well-defined problems because closed problems lead to convergent thinking. Open problems inspire divergent thinking, which lies at the heart of creativity.

Because of the creation part of the Jupiter flipped classroom model, it might take several sessions to deliver the activity. Keep that in mind during the planning stage.

Make or delegate videos

To gain confidence to be on screen, watch the video by Katie Gimbar, who is also a teacher with a lack of time and motivation for technology.

She uses:
- markers and white boards (no power point)
- a camera setup on a tripod (you can equally use your webcam or telephone)
- a chair so she can lean forward and press start, record, pause and go through the information at her own pace
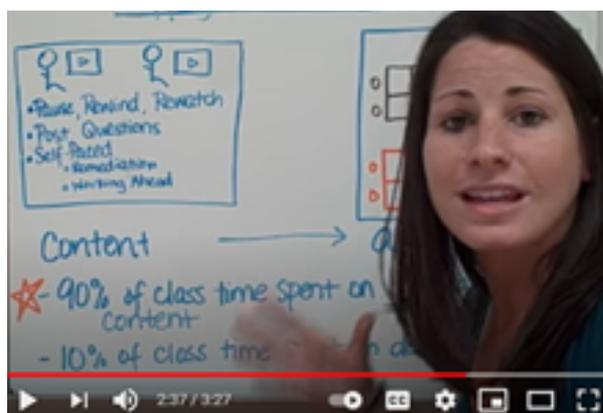- a one take, simple video, and no post-editing

Figure 18. Simplicity of digital teaching. Source: https://www.youtube.com/watch?v=Icn8kMoH28Y

Doing videos in such a way creates a simple template that students can also use, with their own resources, to make their own videos. In this way technology serves you. The content, not the technology shines.

As we emphasised several times, external videos are not always a good choice because of language barriers, unsuitable length, inappropriate examples, etc. Teachers' own video lectures encompass all the necessary components for changing the paradigm of teaching. Firstly, **trust** is built between teachers and students very early on. In the same way as students do not trust a substitute teacher to deliver the correct information for success in your classroom, they will also not trust external content. Students are not confident that an external resource will highlight all the important information to be a successful student in a certain subject with a certain teacher. Creating your own videos incorporates that trust. Students know that the teacher took the time to deliver information and content that they will need to know to pass the course. **Accountability** is the next factor. Creating your own videos holds you accountable to your students, parents, and school leaders. Facial cues, eye contact, and gesturing will help you point out the content you would like your students to especially pay attention to. Speaking directly into the camera will engage students more. It is like having the whole front row seat in a classroom.

Your videos will be more **personalised** because you will use language that is familiar to your students. External video resources use more technical language. Even if the language is in the students' mother tongue, the language of the video can be difficult to understand. In your own videos, you can point out when students have to pay special attention to important information, you can pose questions during videos and discuss them later in a classroom, and make video content appropriate to your students' needs (Gimbar, 2011).

We do not want to turn you against external videos. It is just important to know that you are a valuable resource for your students. Recording your own videos allows you more flexibility in your classroom and teaching style. Because the students trust you, the information is secure and credible when it comes from you.

"I KNOW MY STUDENTS AND THEY KNOW ME - THEREFORE THERE IS A KIND OF CONNECTION ALREADY ESTABLISHED. I EXPLAIN THINGS TO THEM IN DIFFERENT WAYS SO THAT THEY CAN UNDERSTAND THE LESSON."

Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

"STUDENTS ARE USED TO YOUR METHOD OF WORK AND YOUR VOICE. ONCE I SENT THEM A VIDEO FROM ANOTHER TEACHER. THE STUDENTS ASKED ME: TEACHER, WHAT ARE WE GOING TO LEARN TODAY?"

Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

Prepare innovative in-class activities

In problem-based learning the teacher chooses an open problem and facilitates students to come up with innovative solutions. Ideally, a problem is a real-world situation that resembles something students may encounter in their future careers or lives. The teacher facilitates a process in which students are able to provide a well-constructed answer in a tangible form. Students do field research, tap into online resources, use their background knowledge, and ask critical questions to brainstorm and present a solid solution. For example, a problem-based learning project could involve students pitching ideas and creating their own plans to solve a societal need. Students could work independently or in a group to conceptualise, design, and launch their innovative product in front of classmates and community leaders.

For a teacher, it is sometimes difficult to come up with open problems. We recommend teachers look into different publications on megatrends and future issues to come up with relevant problems. Megatrends are powerful, transformative forces that can change the trajectory of the global economy by shifting the priorities of societies, driving innovation and redefining business models. They have a meaningful impact not just on how we live and how we spend money, but also on government policies and corporate strategies.

The Internet offers several free publications on future trends. Here, we also provide a list of megatrends which can be used as inspiration for problem based learning (Schneider, 2020):

Demographic change: growing global population, ageing population, increasing migration streams, declining population in the west

Individualisation reaches a new stage: individualism as a global phenomenon, changing relationships, complex biographies and identities, from mass markets to micro markets

Changes in gender roles: breakdown of traditional gender roles, increasingly important role of women in the workplace, appreciation of social skills, growing importance of a healthy work-life balance, new family structures and lifestyles

A new pattern of mobility: mobility increases worldwide, barriers to mobility increase, digital networking of traffic, new vehicle concepts, intelligent logistics solutions
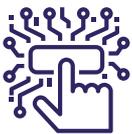
Digital culture: digital technologies in all aspects of life, greater differentiation between digital lifestyles, a new form of social communication, participation, and organization, web 4.0

Knowledge-based economy: rising levels of education around the world, data and knowledge-based value creation, new global knowledge elite - the creative class, lifelong learning

Business ecosystems: new value chain partnerships, systems innovations, business mash-ups, complexity management

Changes in the world of work: highly dynamic and flexible working practices, new managerial and organizational patterns, collaborative methods of working, advances in automation

New consumption patterns: shifts in consumer spending and consumer preferences, third world countries enjoying greater prosperity, catch-up consumption in newly-industrialised countries, sustainable consumption in the west (eco, bio, fair trade), change in buying habits, growing importance of collaborative consumption.

Figure 19. Global megatrends.

Encourage creation

The megatrends above can help you to design problem-based activities for your students in which you encourage them to analyse data, evaluate the content and create something new based on their own research.

A design thinking process might help you in leading your students through problem-based learning. It takes several logical phases in which students experience all aspects of transforming problems into solutions. Design Thinking is an iterative process in which we seek to understand the user, challenge assumptions, and redefine problems in an attempt to identify alternative strategies and solutions that might not be instantly apparent with our initial level of understanding. At the same time, design thinking provides a solution-based approach to solving problems. It is a way of thinking and working as well as a collection of hands-on methods (Brown & Katz, 2009).

The process is structured into five phases: discovery, interpretation, ideation, experimentation, and evolution. In the discovery phase, the teacher presents a challenge to the students. The students dig deep into various aspects of the challenge using internet resources, field work, observation, and interviews in order to understand the problem. In the next phase, interpretation, the students gather together the information they collected during the discovery phase. They share learning insights, data and material, discuss possible conclusions and hypotheses. Next is the ideation phase. In ideation students can use different brainstorming techniques to create a number of possible solutions to the problem. In the experimentation phase, students choose among the possible solutions and create prototypes of their chosen solutions. In the evolution phase, students start an iterative process of presenting their solution and implementation plan, collecting feedback, and improving their initial plan. This process is carried out until a solid answer to the initial challenge can be proposed.

PHASES OF DESIGN THINKING

DISCOVERY:

use different methods to understand your challenge from various perspectives.
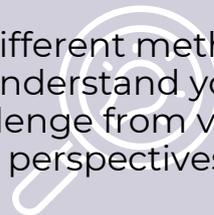
INTERPRETATION:

share your results with other students.

IDEATION:

brainstorm possible solutions.

EXPERIMENTATION:

show your solutions as a prototype.

EVOLUTION:

find feedback to your prototypes, upgrade it and develop an implementation plan, repeat prototyping and planning several times.
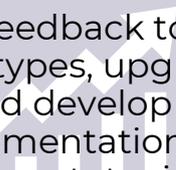
Figure 20. Phases of design thinking.

Guide student reflection

Metacognitive strategies empower students to think about their own thinking. Awareness of the learning process enhances control over their own learning (HITS, 2020). The flipped classroom approach enables teachers to promote metacognition in all the phases of learning. Below you can find a table with a set of questions to use when you want to encourage your students to think about their own learning. The set is not inclusive, but it can serve as a source for tailoring questions to the subject you are teaching.

Table 10. *Sample questions to encourage students to think about their own learning* (Tanner, 2012)

PLANNING	MONITORING	EVALUATING
What are the goals of the class session going to be?	What insights am I having as I experience this class session?	What was today's class session about?
What do I already know about this topic?	What misunderstandings do I have?	What did I hear today that is in conflict with my prior understanding?
How could I best prepare for the class session?	What questions are arising for me during the class session? Am I writing them down?	How did the ideas of today's class session relate to previous class sessions?
Where should I sit and what should I be doing (or not doing) to best support my learning during class?	Do I find this interesting? Why or why not? How could I make this material personally relevant?	What do I need to actively do now to get my questions answered and my confusions clarified?
What questions do I already have about this topic that I want to find out more about?	Can I distinguish important information from details? If not, how will I figure this out?	What did I find most interesting about class today?

5.2 JUPITER FLIPPED CLASSROOM EXAMPLES

JUPITER FLIPPED CLASSROOM: EXAMPLE 1

Source: Ankica Šarić, English language teacher

Topic: Mock trial based on the Stephen King's novel Misery

Short presentation:

Students read and analyse King's novel Misery and learn about the legal system in the USA. They strengthen their legal English (oral and written) vocabulary and are encouraged to use it in a situation that recreates an authentic experience. They prepare a script for a mock trial, organise a classroom court, and role-play the mock trial. The activity strengthens students' skills of analytical and critical thinking, creativity, leadership, time management, active listening, teamwork, and it enables them to build self-confidence.

Part 1
As preparation for the class students read the novel and do research on the American legal system (using EdPuzzle). They also practice legal vocabulary –meaning and pronunciation using YouTube videos, Quizlet and interactive videos with questions at EdPuzzle.

Part 2
In the classroom, the students analyse the novel together with the teacher using a mind map. Next, the students are divided into three teams, the prosecution, defence and jury. Each student is assigned a role, and the mock trial is planned.

Part 3
At home, students practice the legal vocabulary using Kahoot! They also analyse an example of a mock trial. Students work in teams and prepare for the mock trial using Google Disk.

Part 4
At school, students have the opportunity to make final preparations and rehearse for the mock trial in their groups. At the end, they role play this mock trial.

Why is this activity a good practice example?
This activity is student-centred. Students are active learners, and the role of the teacher is to provide guidance, monitor students' work, and provide feedback and assistance. It is a combination of content-focused and process-focused methods. It encourages students to explore and engage with the content at home and come to class prepared. In addition, students have to cooperate and work together online and in the classroom. This time in the classroom provides additional opportunities to learn from one another and strengthen skills such as communication, teamwork, organisation and planning, flexibility and persistence. The teacher monitors the whole process and assesses the students' work based on the assessment criteria that was given, also to the students, at the beginning of the activity. Several digital tools are used (EdPuzzle, Kahoot!, Padlet and Google Disk) which enable students to learn through different methods and in a more interactive way. The activity also strengthens students' skills of public speaking and debate. The activity also enables students to critically assess the information provided at the mock trial by their peers. It gives the teacher more time to monitor the work of the students and to provide additional support and feedback.

JUPITER FLIPPED CLASSROOM: EXAMPLE 2

Source: IVOC, Instituut Voor Vorming En Onderzoek In De Confectie – Institut Pour La Recherche Et L'enseignement Dans La Confection, www.ivoc.be

Topic: Flipped learning for textile and clothing executives in Belgium

Short presentation:

In Belgium, workplace supervisors from textile and clothing companies can master the techniques of leadership, such as motivating workers, conflict management and giving feedback, in an original way.
After a few days of classroom training with many cases and exercises, the classroom flips and coaching replaces training. Individual questions and any difficulties that the supervisors experience in their team leadership can then be discussed and explored in-depth, live or online.
Moreover, the supervisors are not only taught by an experienced trainer or coach. They can further supplement what has been learned with the experiences of fellow supervisors who work in the textile and clothing sector. This (social) network is supported via a Whatsapp group with peers. In this way, members receive additional information (videos, articles, assignments, etc.) about team leadership between sessions. Also, this is an opportunity to exchange insights and knowledge with others who work in the same domain.

Applicability of the acquired skills in the job
(Evaluations of 59 trainers in classroom training and 32 trainees in flipped classroom situations in 2021.) .

Figure 21. The average satisfaction with the applicability of the acquired skills in the job in classical and flipped learning models. The scale is from 1 to 6. Source: IVOC, 2021

Why is this activity a good practice example?
It is an example of a low technology flipped classroom, which shows that sometimes we are too worried about our digital competence and overrate the value of digital tools. The learning process described above is located on the higher levels of Bloom's taxonomy, such as evaluating and creating, but it does not require a high level of digital competence.

JUPITER FLIPPED CLASSROOM: EXAMPLE 3

Source: Željka Brezni, German language teacher

Topic: Virtual walking tours in our town

Short presentation:

Students explore their own town, learn to use the app TaleBlazer, and prepare an interactive virtual game – a tour of their town conducted in a foreign language. Students develop organisational and problem solving skills. In addition, they strengthen and promote multilingualism.

Part 1
As preparation for the class, students research tourist sites in their town by visiting them. Alternatively, they can do this online. Students then prepare a plan which includes the sites that are part of the tour. They take photographs (or find them on the internet) of these sites.
They also study the app TaleBlazer and learn how to use it.

Part 2
In the classroom, students prepare questions and information about the sites in their town for the interactive virtual tour. With the support of the teacher (and other students), they create an interactive game – a virtual tour of the town.
When the final games are ready, students test and try out each other's games. After, they provide their classmates with feedback for improvements.
The teacher also provides feedback and suggestions for improvements to the students.

Why is this activity a good practice example?
This activity encourages students not only to prepare for the class in advance, but also to do field research and explore their own town in a different way. Students learn about their town, use a foreign language, and also learn about the app TaleBlazer. Throughout the process, the teacher provides assistance and feedback. In addition, the students are peer reviewers. They have to test their classmates games and give them feedback. This activity also encourages students' creativity, and it ensures efficient use of class time.

JUPITER FLIPPED CLASSROOM: EXAMPLE 4

Source: Zvonimira Špoljar, Politics teacher

Topic: Elections - Political parties of the 19th century

Short presentation:

Students learn about the two political parties of 19th century Croatia. They are asked to distinguish between the plans and programmes of the parties. They are encouraged to think critically about these parties. Students explore political speeches and learn about election procedures. In addition, students create short movies about the political conflict between the two parties, and develop ICT skills through recording videos, making posters and writing political content through applications.

Part 1
As preparation for the class, students analyse and study the two parties of the 19th century, Narodna stranka and Stranka prava. They also study the political speeches of the parties leaders, Ante Starčević and J. J. Strossmayer.

Part 2
In the classroom, students do several tasks. First, they compare facts about the two parties and read aloud parts of the speeches. Students assign themselves different roles based on the two political parties and then create political content online (using the Canva platform). The roles include: two students, who represent the two presidents of the parties, prepare and give a political speech and there is a team creates a movie about the political conflict between the political leaders. At the end, all students prepare a plan for the elections and voting process.

Part 3
At home, students prepare and design political pamphlets and slogans using Canva. Two students prepare and practice the political speech. The video team creates a movie about the political conflict.

Part 4
At school, students organise elections and prepare the necessary things for the voting process. Before the voting starts the two chosen students give their speeches to convince voters to vote for their political party. Students also revise the pamphlets and then decide which party will receive their vote. Elections are simulated, and the winning party is declared.

Why is this activity a good practice example?
This activity enables students to be active and engaged learners throughout the process through individual and teamwork. They prepare for the class in advance. Students have the opportunity to choose some of the tasks and roles of the activity, which means using different methods and tools (e.g. video, role play, design, public speaking). Students have to cooperate to simulate elections and they also build their communication and teamwork skills. Furthermore, the teacher has more time in the classroom to guide students, give feedback on the students work (pamphlets, movie, speech), and provide additional information about the topic. Through interactive and interesting tasks, the content of the lesson is richer, and students can better understand the history, programmes, and activities of both political parties from the 19th century.

JUPITER FLIPPED CLASSROOM: EXAMPLE 5

Source: Factive Partnership

Topic: Redesign of traditional aprons

Short presentation:

Students will redesign a traditional kitchen apron. Through this activity students gain knowledge about how to connect their current design challenge with global megatrends. In addition to creativity, they also develop a sense of initiative and entrepreneurship.

Part 1
At home students have to do desk research about different forms and usage of aprons. As support material, the teacher prepares a worksheet with the following questions:
How popular are aprons? How are aprons displayed in the kitchen? What are the advantages of different designs of kitchen aprons? What materials are used for kitchen aprons?

Part 2
In the classroom we first discuss their findings with simple questions such as: What surprised you the most? What are the facts you did not know before your research? After the discussion students form groups of 4 to 6 students who will redesign a traditional apron using inspiration from one of the global megatrends. The teacher presents three global megatrends: digitalisation, circular economy, and green and sustainability. The task for students is to be inspired by one of the global megatrends and redesign a classical apron in line with their chosen megatrend.

To help students, the teacher can pose some questions to lead their thinking.

SUBSTITUTE: What materials or resources could you substitute or swap to design a circular apron? What other materials could you use? What designing rules could you substitute to design a circular apron? What would happen if you changed your feelings or attitude toward the circular economy?
COMBINE: What would happen if you combined current material with new material? What would happen if you combined different aprons?
ADAPT: Who could be your role model in designing a circular apron? What inspiration could you use in designing your circular apron?
MODIFY: What could you add to design a circular apron? What element of an apron (printing, material, design, gifts, branding, pockets, etc.) could you strengthen to design a circular apron?
PUT TO ANOTHER USE: Can you use your circular apron on other occasions? Who else could use your circular apron? What would happen to the quality of your aprons if they were used in another setting? Could you reuse the apron?
ELIMINATE: How could you simplify an apron with circularity? What features, parts, or rules in designing aprons could you eliminate? How could you make circular aprons elegant, more engaging, or more fun? What would happen if you took away all the classical features of an apron?
REVERSE: What if you tried to do the exact opposite of what you are trying to do now? What would happen? What roles using aprons could you reverse or swap?

Part 3
At home students build a prototype of a new apron using simple material such as old paper, clips, tape, etc.

Part 4
They present their prototype as a video commercial for their new apron. After the presentation, the teacher discusses with students what they learned about design, megatrends, and entrepreneurship.

Why is this activity a good practice example?
Redesigning aprons is a short problem based activity connected with real life. As such students combine work at school with work at home to deliver new creative solutions. It is also an example of cross-curricular activity because it teaches students different skills.

5.3 A FINAL THOUGHT ABOUT THE MOON, MARS AND JUPITER MODELS

The planets are not just heavenly bodies in space. They are part of the universe ready for us to journey to, investigate and explore. The Moon, Mars, and Jupiter flipped classroom models aim at encouraging teachers to start or continue their journey of professional development, and to investigate and explore what they can do to help their students gain knowledge.

But how to persevere? Sometimes a teacher tries something new and realises it does not work with their students. As a consequence, the teacher might feel unsuccessful and disappointed. This can easily happen also when implementing the flipped classroom. On our professional development journey it is thus important to be aware how our mind works and responds when we are successful or unsuccessful. We can explain this with the idea of upward and downward spirals. When we experience an initial success we are proud and experience pleasant emotions and thoughts. This puts us in an upward spiral. We feel encouraged by our initial success and are ready to try and experiment more.

But when we do not have success in the beginning, this might lead us in a downward spiral. This initial unpleasant experience might result in negative thoughts and anxiety which will prevent us from trying more or experimenting in different ways.

Do not stop trying if you experience initial resistance, doubts, lack of motivation or lack of teamwork. Keep trying. Sooner or later you will find your own way of flipping the class. When you will accumulate several positive experiences, you will be motivated to continually upgrade and advance your teaching ideas, and you will see your students' motivation grow.
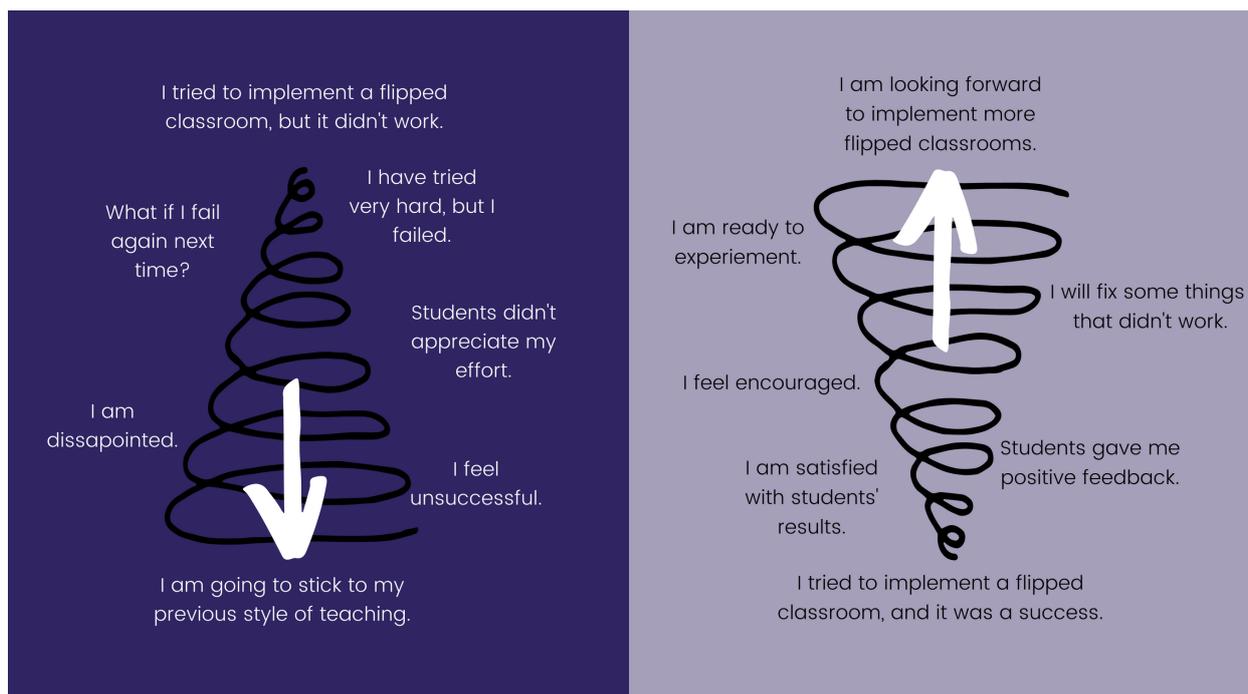

Figure 22. Upward and downward spirals of development.

CHAPTER **6**

GAMIFICATION-ENHANCED FLIPPED LEARNING

Flipped learning is a powerful instructional strategy, but one of its main critical aspects is the fact that, for it to be effective, students should not skip out-of-class learning activities. Here is where gamification, that is the "use of game design elements to motivate user behavior in non-game contexts" (Deterding, 2011), can be helpful. The use of some selected game elements (e.g. points, badges, boss fight, level, leaderboards) and game design techniques for educational purposes might motivate the new generations of digital natives, that have grown up in the age of video games (Glover, 2013) for whom traditional learning methodologies are less and less appealing and motivating (Prensky, 2001).

The use of gamification in education, which has increased considerably over the past years, seems to have increased students' motivation, and specifically, it seems to have promoted student engagement in the out-of-class learning activities of flipped courses.

To gamify your flipped course, you may follow two approaches:

- Gamify the course structure
- Gamify specific learning activities

Let's see how to proceed in each of these scenarios.

6.1 GAMIFIED COURSE STRUCTURE

To gamify the entire course structure is the most complex and ambitious route to follow. In this scenario you have to re-design the structure of the course and give it a game-like structure.

For instance, if your course is divided into several topics, each topic will represent a level of your gamified course. In order to progress through the different levels, students will have to reach a certain amount of points. To gain points, students will have to complete missions (carrying out learning activities), defeat mini-bosses (successfully completing quizzes), explore the game world (reading learning materials), etc.

It may be useful to imagine a game narrative (a game world with characters, locations, conflict, a final goal, etc.) to foster the students' affective engagement and curiosity. The game narrative should be present in all course elements, from the syllabus to the assessment, and should progress according to the students' learning progress.

In a flipped learning course which is entirely gamified, out-of-class learning activities should allow students to gain points and/or other in-game rewards to be used during class-time (e.g. the student or team achieving the highest score in an out-of-class activity can have some extra time to complete an in-class learning activity, or earn the privilege of retaking a quiz) or shown a success in completing different tasks (i.e. a badge attesting that a students was the first to submit a homework assignment or a leaderboard).

Some learning management systems, such as the open source Learning Management System Moodle can help you manage your gamified course thanks to some plug-ins specifically designed for gamification, such us LevelUp and Stash.

Since designing and gamifying an entire course can be challenging and time consuming, it can be better to start small, gamifying single learning activities or course learning modules, as described in the next paragraph.

"TRY MULTIPLE GAMIFIED ACTIVITIES TO SEE WHICH ONE WORKS BEST IN YOUR CLASS."

Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

6.2 GAMIFIED LEARNING ACTIVITIES

If redesigning an entire course is too daunting, gamifying only a subset of course activities or learning modules is also an interesting option. For instance, small groups of students can compete for best participation in a classroom debate, or compete who has the most creative in-class presentation about a previously agreed topic.

You can decide to award special badges to those students who complete the most out-of-class learning activities or miss the fewest number of classes.

Similarly, a leaderboard based on course achievements or effort can provide students with important feedback about their performance in the course.

Small game-like activities may be created for specific in-class assignments as well. For instance, you can use digital

tools, such as Kahoot! or Socrative, to create a friendly competition among students (individually or in groups) during classes, or to offer students a more playful way to test their knowledge at home.

In a flipped learning course, you may decide to gamify the out-of-class learning activities to foster friendly competition, to encourage students to submit their homework on time, to reward students that continuously complete out-of-class learning activities, etc.

Also, if you are gamifying a subset of course activities, using a digital platform (such as Moodle) can make keeping track of students' learning performances easier, as well as providing timely feedback and assigning points and badges to students.

6.3 GAME ELEMENTS

Points, badges and a leaderboard are probably the first game elements that come to mind when attempting to gamify a course or learning activity, but there are many more. The following table (table 8), provides a more extensive list of game elements that can be considered during the design phase of a gamified course.

Table 11. *Game elements description* (Shi et al., 2019)

GAME ELEMENT	DESCRIPTION
Acknowledgement	All kinds of feedback that praise the players' specific actions. Some examples and synonyms are; badges, medals, trophies.
Chance	Randomness and probability characteristics to increase or decrease the odds of certain actions or outcomes. Some examples and synonyms are; randomness, luck, fortune.
Competition	When two or more players compete against each other. Some examples and synonyms are; Player vs Player, scoreboards, conflict.
Cooperation	When two or more players collaborate to achieve a common goal. Some examples and synonyms are; teamwork, co-op missions.
Economy	Transactions within the game, monetising game values and other elements. Some examples and synonyms are; markets, transaction, exchange.
Choices	Decisions that the player is obliged to make in order to advance the game. Some examples and synonyms are; judgements, forced choices. (Not to be confused with the game element narrative).
Level	Hierarchical layers, which provide a gradual way for the player to obtain new advantages as they advance in the game. Some examples and synonyms are; character levels, skill level.
Narrative	Order of events in a game. These are choices influenced by the players' actions. Some examples and synonyms are; the strategies the player uses to go through a level (stealth or action), the good or bad actions that influence the ending, karma system.
Novelty	New, updated information presented to the player continuously. Some examples and synonyms are; changes, surprises, updates.
Objectives	Guide the players' actions. Quantifiable or spatial, from short to long term. Some examples and synonyms are; missions, quests, milestones.
Point	Unit used to measure users' performance. Some examples and synonyms are; scores, number of kills, experience points.

GAME ELEMENT	DESCRIPTION
Progression	This allows players to locate themselves (and their progress) within a game. Some examples and synonyms are; progress bars, maps, steps.
Puzzles	Challenges within the game that should make a player think. Some examples and synonyms are; actual puzzles, cognitive tasks, mysteries.
Rarity	Limited resources and collectables. Some examples and synonyms are; limited items, rarity, collection.
Renovation	When players are allowed to redo/restart an action. Some examples and synonyms are; extra life, boosts, renewal.
Reputation	Titles that the player accumulates within the game. Some examples and synonyms are; titles, status, classification.
Sensation	Use of players' senses to create new experiences. Some examples and synonyms are; visual stimulation, sound stimulation.
Social Pressure	Pressure through social interactions with another player (s) (playable and non-playable). Some examples and synonyms are; peer pressure, guilds.
Stats	Visible information used by the player, related to their outcomes within the game. Some examples and synonyms are; results, health bar, magic bar, HUD, indicators, data from the game presented to the user.
Storytelling	It is the way the story of the game is told (as a script). It is told within the game, through text, voice, or sensorial resources. Some examples and synonyms are; stories told through animated scenes, audio queues or text queues during the game.
Time Pressure	Time constraints within the game. Some examples and synonyms are; countdowns, clock, timer.

It is also important to keep in mind some general aspects that can lead to greater outcomes in terms of students acceptance of a gamified learning approach, and of students' motivation and engagement:

Freedom to fail:

Students must be free to experiment and to make mistakes. For instance, it can be useful to allow them to retake quizzes, pointing out what knowledge/skills they need to improve in order to achieve a better result.

Clear objectives:

Games are very good at keeping us engaged by providing us very specific objectives that can be achieved in the short term. In order to do this, the final goal of a game is usually divided into several medium-term goals, that in turn are divided into more short-term goals. This way we always know what to do, and we have a clear path to follow in order to achieve the final goal.

Immediate feedback:

Often, feedback is not given immediately because of the time necessary to grade and return assignments. However, rapid feedback during engagement with a game is a key feature for successful implementation. In a learning environment, rapid feedback is crucial because students clearly understand how well they are performing. The use of digital tools, such as the previously mentioned Kahoot! or Socrative, can be a useful resource to help you provide in-time feedback in a playful way.

Collaboration over competition:

In a classroom setting, competition may be difficult to manage, and it may also undermine the learning process. So, it is better to de-emphasise victory and consider competition between groups instead of individuals.

Feeling of making progress:

Seeing their progress, for instance through completion bars or leaderboards, is highly motivating for students and can help them see where they stand, even if they are near the bottom.

Choices:

Gamification strategies are more motivating when they are perceived as allowing students a certain level of freedom, and allowing students to make their own choices. Students may choose between different weekly tasks to complete, or choose which privilege to buy with the points they have gained, i.e. the privilege to turn in an assignment a day or two later, or even use their points to personalise their avatar in the gamified system.

Storytelling elements:

Adding narrative elements to a gamified system can lead to a higher level of immersion and affective engagement of students. A well designed narrative can also motivate students by providing an ulterior meaning for their actions, such as leveling up in order to gain more powers and being able to face and defeat an enemy.

Several resources can be used to make a first attempt at gamifying a course.

Table 12. *Resources to start gamifying your flipped teaching*

TYPE OF RESOURCE	RESOURCE
QUIZ LIKE TOOLS	**Kahoot!** It is a tool that allows you to create question and answer games in a very intuitive way. https://kahoot.com/ **Socrative** Similar to Kahoot! it allows you to create game-like assessment moments. https://www.socrative.com/ **Gimkit** Allows students to earn in-game cash by answering questions correctly, and lose in-game cash if their answers are incorrect. Students can reinvest their earned digital money by purchasing upgrades and power ups that suit their strengths. https://www.gimkit.com/
ESCAPE ROOM	**Room Escape Maker** It allows the creation of games to introduce new learning concepts or to assess students' knowledge. You can even ask students to create a game using the information they have learned to share with fellow students. https://roomescapemaker.com/
GAMIFIED LEARNING PLATFORMS	**Classcraft** It is probably one of the best games and classroom management solutions for high school students. Students create their own avatars, and then are assigned to groups. By playing by the classroom rules or by breaking them, they can gain or lose points, and their behaviour affects their whole group. https://www.classcraft.com/

"WE, AS TEACHERS, SHOULD ALWAYS KEEP IN MIND THAT STUDENTS MAY NOT BE INTERESTED IN THE AREAS WE ARE INTERESTED IN. WE SHOULD TRY THEIR PERSPECTIVE."

Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

CHAPTER

7

FLIPPED CLASSROOM SCENARIOS

After reading the flipped classroom handbook you are probably full of thoughts, insights and ideas. Let's capitalise on them and make sure that you will remember all the tricks and hacks that were introduced to you. Below you can find several thought-provoking cases. Go through them and record your ideas. The activities aim to use your critical thinking skills to strengthen your understanding of the flipped classroom.

If you like, you can give responses to the proposed activities before reading the handbook. At the end, return back to this section to check your statements. After, you can confirm your statements, make adjustments, or completely change them based on what you have learned.

Read the flipped classroom scenarios (see worksheets below). Make recommendations on how you would improve these flipped classroom scenarios.

Flipped classroom scenarios and your recommendations for improvement : CASE 1

April Lynn Burton, a French teacher at Francis Howell Central High School, learned from the mistakes she made in her first year of using flipped classroom methods. April says that at first she tried to make video assignments using the textbook, without her voice explaining the content of the video. As a result, her flipped classroom failed terribly, and she ended up receiving complaints from her students saying, "You never teach us."
Source: https://elearningindustry.com/4-steep-pitfalls-must-avoid-flipping-a-classroom

Your recommendations for improvement:

Flipped classroom scenarios and your recommendations for improvement : CASE 2

Genetics, evolution and biodiversity topics. Students prepared for the weekly flipped class by watching short online videos and completing a summative quiz. There were 11 quizzes over the semester, worth 15% of the topic grade. Each quiz was designed to test the surface understanding (the gist) of the topic content. The quizzes consisted of five multiple choice questions, and one non-assessed reflection question. The students accessed the quizzes online. The quizzes closed the day before the first flipped class of the week. This gave the facilitator of the flipped class the opportunity to review the quiz responses, and address any questions or concerns raised by the students at the start of the next flipped class. The remainder of the flipped class was spent working in groups through sets of problems which tested application and analysis of topic content (Smallhorn, 2017).

Your recommendations for improvement:

Flipped classroom scenarios and your recommendations for improvement : CASE 3

The lab sessions were designed to provide authentic tasks in alignment with the online lectures. The instructor found that some students did not watch the lecture online and thus had difficulty in engaging in the lab sessions, which later resulted in ineffective learning (Kim, Jung, de Siqueira & Huber, 2016).

Your recommendations for improvement:
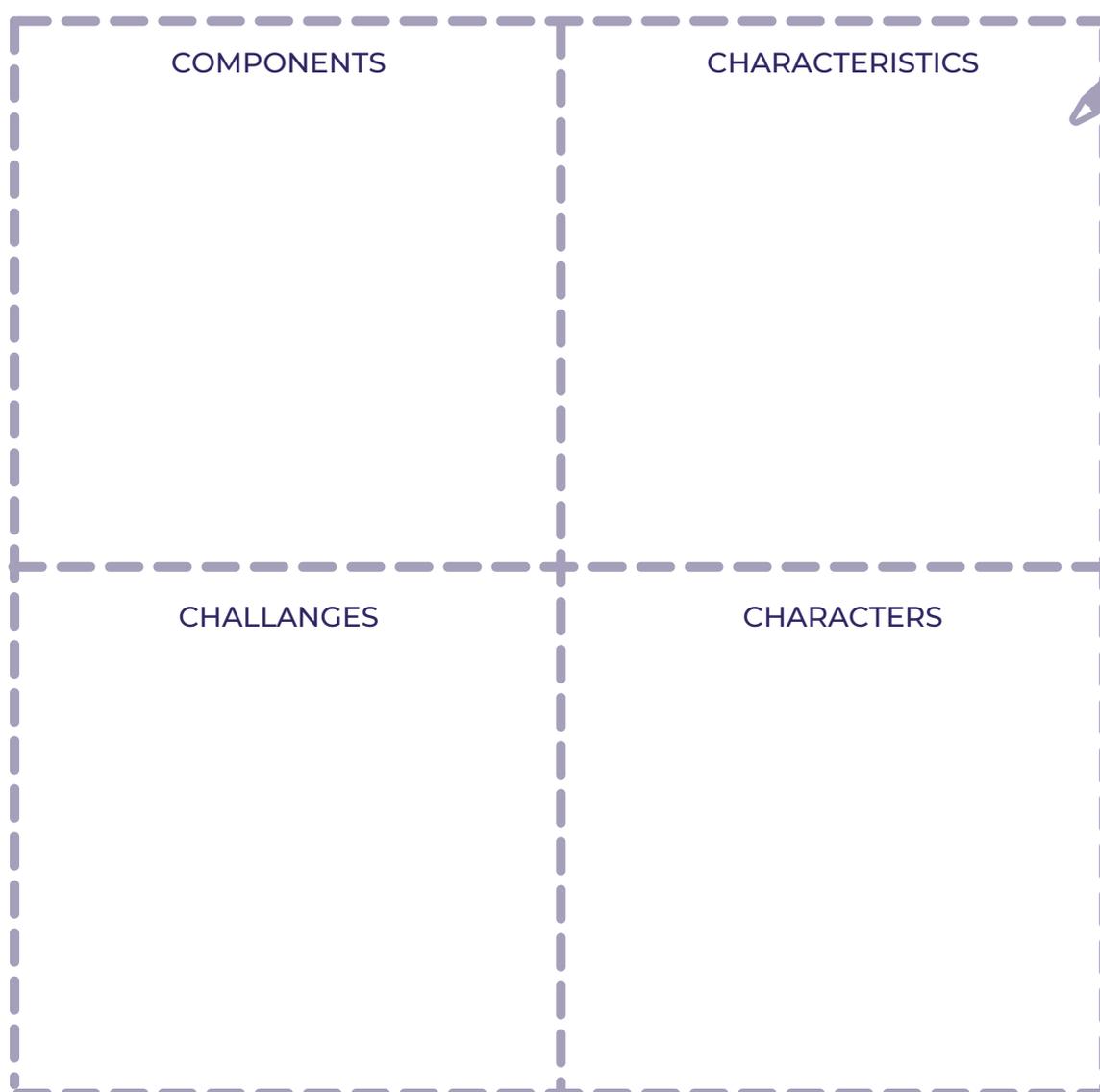
The 4Cs of the flipped classroom

Now, organise your ideas about the flipped classroom. You can write in this handbook or use a separate sheet of paper. Write as many ideas as possible for each category. After, you can share your ideas with your fellow teachers.

Categories:

- **Components** are parts, phases and practical details about the implementation of the flipped classroom.
- **Characteristics** are features of the flipped classroom. How efficient is the flipped classroom? In which circumstances is the flipped classroom most useful? What factors motivate students and teachers when using the flipped model?
- **Challenges** are obstacles associated with the flipped classroom.
- **Characters** are people associated with the topic. Where can you get support and help when implementing the flipped classroom? Which of your character strengths will help you implement the flipped classroom?

Table 13. *4Cs of the flipped classroom*

COMPONENTS	CHARACTERISTICS
CHALLANGES	CHARACTERS

100 € test of the flipped classroom

In this activity you have an imaginary 100 € to spend to help you set up a flipped classroom. Look at the items you can spend the money on below. Add three more items you would like to be able to finance for your flipped classroom. List the items from most to least important. Then decide how much you would spend on each of your items. Allocate the most money to the item which has the highest priority on your list. There is an additional column where you can justify your reasons.

Table 14. *100 € test worksheet*

100€ TEST

ITEM / TOPIC / ISSUE	€	WHY?
Motivating myself and/or students		
Upgrading my moderation and facilitation skills		
Educating students on how to watch videos		
Designing flipped classroom lessons		
Recording videos		
Learning new digital tools		

SCAMPER your teaching to flip the classroom

SCAMPER is a simple brainstorming technique which uses questions to help you to create a flipped classroom. SCAMPER is an acronym for Substitute, Combine, Adapt, Modify, Purpose, Eliminate, and Reverse.

Reflect on your teaching with the help of the questions below. Try to think of ways you can flip your classroom. You do not have to answer each question. Add your own ideas as well.

SUBSTITUTE

What learning materials or resources could you substitute or swap to flip your teaching? What other materials could you use? What rules in your classroom could you substitute to flip your teaching? What would happen if you changed your feelings or attitude toward the flipped classroom?

COMBINE

What would happen if you combined your current learning material with external material? What would happen if you combined learning objectives in different curricula? What could you do to maximise student motivation? How could you combine students' talent with resources to create a flipped approach to learning?

ADAPT

How could you adapt your learning material to the flipped classroom model? Who could be your role model in the flipped classroom? What inspiration could you use in designing your flipped classroom?

MODIFY

How could you change the duration of your current learning activities, the amount of teaching input, and emotional involvement? What could you add to flip your teaching? What could you emphasise or highlight to create the flipped approach? What element of teaching (planning and assessment, positive environment, setting expectations and promoting inclusion, health and wellbeing, evidence-based strategies) could you strengthen to create flipped teaching?

PUT TO ANOTHER USE

Can you use your flipped material in some other subjects or teaching opportunities? Who else could use your flipped materials? What would happen to the quality of your flipped materials if they were used in another learning setting? Could you reuse the flipped material?

ELIMINATE

How could you streamline or simplify your teaching through the process of flipping your teaching and establishing a flipped classroom? What features, parts, or rules in your teaching could you eliminate? How could you make flipped learning faster, more engaging, or more fun? What would happen if you took away all the learning materials you use in your teaching? With what would you replace the learning materials?

REVERSE

What would happen if you reversed the way you taught a topic from the beginning to end? What would happen if you sequenced the activities you used differently? What if you tried to do the exact opposite of what you are trying to do now? What would happen? What roles in teaching could you reverse or swap?

CHAPTER 8

FLIPPED CLASSROOM ONLINE RESOURCES

"BE WILLING TO LEARN, HAVE TRUST IN CHILDREN BECAUSE THEY CAN DO IT, YOU JUST HAVE TO LET THEM. ACCEPT NOT ALL STUDENTS ARE THE SAME SO IT'S NORMAL THEIR ACHIEVEMENTS VARY IN QUALITY."

Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

"TRUST YOUR STUDENTS, THEY ARE ABLE TO ASSUME LEARNING AND USING THE INFORMATION PROVIDED IN A PROPER MANNER. THEY WILL FEEL EMPOWERED AND ENGAGED IN THE ACT OF EDUCATION."

Quote by anonymous teacher from the 11th Pan-European Conference on Digital Education: Flipped Classroom.

Table 13. *Useful online resources in alphabetical order*

PLATFORM	DESCRIPTION
Answer Garden https://answergarden.ch/	A minimalistic feedback tool that can be used for real time audience participation, online brainstorming and classroom feedback.
BBC https://www.bbc.co.uk/learningenglish/	A video library for learning English.
BookWidgets https://www.bookwidgets.com/	An easy-to-use platform for creating interactive exercises (and automatically graded tests) such as exit slips, games, timelines, photo- and video-based activities, and more. Teachers can choose from more than 40 digital exercise templates that work on smartphones, tablets, and computers. Many exercises are automatically graded, which frees up time for the teacher to give quality feedback to students with a click. It integrates with other programs like Google Classroom, Canvas, and Moodle.
British Council https://learnenglishkids.britishcouncil.org/listen-watch	Different material for learning English.
Camtasia https://www.techsmith.com/video-editor.html	A screen recorder and video editor that makes it simple to record and create professional-looking videos. With Camtasia it is possible to create how-to and demo videos, meeting recordings, YouTube videos, video lessons, instructional and explainer videos, and presentation recordings.
Canva https://www.canva.com/	A graphic design platform used to create social media graphics, presentations, posters, documents and other visual content. A drag and drop interface makes customising thousands of templates (also Jamboard) simple and easy. Canva's wide array of features allows users to design and edit visual content without extensive knowledge or experience.
Doodly https://www.doodly.com/	A whiteboard animation program for creating videos that appear to be recorded as if someone drew them on a whiteboard. It is a drag-and-drop interface for creating sketches and easy to use as anyone can use it to create classroom, social media, and other kinds of videos in just minutes.
Duolingo https://www.duolingo.com/	A popular language-learning platform and mobile app. It also offers a digital language proficiency assessment exam. It makes education free, fun, and accessible to all, and it is designed to feel like a game. The Duolingo English Test is an affordable and convenient language certification option that is accepted by over 2000 universities.

PLATFORM	DESCRIPTION
Edpuzzle https://edpuzzle.com/	An easy-to-use platform where you can make any video for your lesson. With just one click, you can find video lessons created by other teachers, including formative assessment. Another click and you can adapt that video by embedding your own questions or audio. You can also use other videos from external platforms or upload your own.
Flipgrid https://info.flipgrid.com/	A website that allows teachers to create "grids" to facilitate video discussions. Each grid is like a message board where teachers can pose questions, called topics, and their students can post video responses that appear in a tiled grid display.
Genially https://www.genial.ly/	A media creation platform and an online tool that can be used to create and share still, animated, or interactive visuals, such as posters, videos, images, infographics, quizzes, and presentations. To create visuals, students can use pre-made templates (organized into 12 types) or start from scratch.
Google Jamboard https://jamboard.google.com/	A digital whiteboard that allows for remote or in-person collaboration on a shared space. Students can sketch out ideas, solve problems, or draw collaboratively and synchronously. Jamboard makes learning visible and accessible to all collaborators on the jam session. Users can quickly pull in images from a Google search, save work to the cloud automatically, use the easy-to-read handwriting and shape recognition tool, and draw with a stylus but erase with their finger – just like a whiteboard.
Home Science Tools https://www.homesciencetools.com/ https://learning-center.homesciencetools.com/	A website that provides tools and resources for hands-on experiences that inspire parents and teachers to nurture children's love for learning about chemistry, biology, Earth science, physics and engineering. Teachers can find different resources, such as lessons, tips, science projects, curriculum, learning kits and instructions, as well as a stores to buy supplies and equipment.
InShOt https://inshot.com/	An all-in-one visual content editing app. It allows users to create videos, edit photos, and create image collages. The app also has different features that allow the user to trim clips, change the speed of the footage, and add filters, music, and text.
iSLCOLLECTIVE https://en.islcollective.com/	A publishing and sharing platform used by ESL (English as a second language) teachers with resources (worksheets, PowerPoint presentations and video lessons) available in different languages. The site has 6 platforms for the teaching of English, German, French, Spanish, Portuguese and Russian.

PLATFORM	DESCRIPTION
Jigsaw Planet https://www.jigsawplanet.com/	A website which contains digital jigsaw puzzles that can be assembled using any device with a web browser. It also has the capability to upload any image and create a digital puzzle for someone else to solve.
Kahoot! https://kahoot.com/	A game-based learning platform that allows users to create, share and play learning games or trivia quizzes in minutes. Kahoot! is a cloud-based quiz platform that is ideal for students and teachers. It offers more than 40 million games already created that anyone can access, making it quick and easy to get started.
Khan Academy https://www.khanacademy.org/	Khan Academy's library of trusted practice and lessons covers math, science, arts and humanities, language, and life skills. Free for learners and teachers.
Learningapps https://learningapps.org/	A web application that supports learning and teaching processes with small interactive modules. Those modules can be used directly in learning materials, but also for self-studying. The app provides different types of templates in different languages. Blocks (called Apps) include no specific framework or a specific learning scenario, so they are not suitable as complete lessons or tasks, but must be embedded in an appropriate teaching scenario.
Liveworksheets https://www.liveworksheets.com/	It allows users to transform traditional printable worksheets (doc, pdf, jpg...) into interactive online exercises with self-correction. Students can do the worksheets online and send their answers to the teacher. The interactive worksheets may include sounds, videos, drag and drop exercises, matching (join with arrows), multiple choice and even speaking exercises that the students must do using a microphone.
Loom https://www.loom.com/	A video messaging tool for classroom (and business) work that combines the expressiveness of video with the convenience of messaging. With Loom, it is possible to record the screen, voice, and face to create an instantly shareable video in a short time.
Mentimeter https://www.mentimeter.com/	An easy-to-use presentation software with which users can create fun and interactive presentations. It is a cloud-based solution that allows teachers to engage and interact with their students online in real-time. Students can do quizzes and answer questions anonymously.
National Geographic Education https://www.nationalgeographic.org/education/	The National Geographic Website includes ready to use lessons with explanations, images, and free video material.

PLATFORM	DESCRIPTION
Nearpod https://nearpod.com/	A website and app-based digital tool that lets teachers create slide-based learning resources that are interactive for students to engage with and learn from. Nearpod can also use gamification to make learning more engaging and fun. It is also built to work well with lots of pre-existing tools, such as Google Slides, PowerPoint, and YouTube. It offers rich hybrid learning by making it easy to combine media. It has a library of already made videos, and it also provides assessment tools.
Padlet https://padlet.com/	A free online tool best described as an online notice board. It can be used by students and teachers to post notes on a common page. The notes posted by teachers and students can contain links, videos, images and document files.
Quizlet https://quizlet.com	A web-based application developed to help students and teachers to study information through interactive tools and games and master what they are learning. Quizlet can figure out what material students are struggling with and just focus on that. It can also verify what students know and coach them to only stop studying when it thinks they are ready. Online users can create study sets (terms and definitions) or use study sets created by others, including classmates. They then have multiple ways to study the information: virtual flashcards or typing in answers to written or audio prompts. The Quizlet Live tool is for students while working in teams during class.
Quizziz https://quizizz.com/	A platform where teachers can find and create free gamified quizzes and interactive lessons to engage any learner. It is also an online assessment tool that allows teachers and students to create and use one another's quizzes. After providing students with a unique access code, a quiz can be presented live as a timed competition or used for homework with a specific deadline.
Science Buddies https://www.sciencebuddies.org/	A collection of hands-on science resources for home and school. It is the go-to site for anyone heading into a science or engineering project. Teachers will find checklists, handouts, and grading rubrics. It provides teachers a variety of lesson plans, science fair tools (e.g. teacher's guides, science fair project grading rubrics, posters, success stories, etc.) and STEM classroom kits.

PLATFORM	DESCRIPTION
Scientific American https://www.scientificam erican.com https://www.scientificam erican.com/education/	An essential guide to advances in science and technology, explaining how they change our understanding of the world. It is the oldest continuously published magazine in the United States and reaches more than 10 million people around the world each month through its website, print and digital editions, newsletters and app. Engaging features, news, opinion and multimedia stories from journalists and expert authors (including more than 200 Nobel Prize winners) provide need-to-know coverage, insights and illumination of the most important developments at the intersection of science and society.
Screencastify https://www.screencastify .com/	A tool for blended and remote learning. Teachers can make learning more personal in their blended and flipped classrooms by recording lessons, assignment solutions and explanations, and verbal student feedback. It also enables students to do activities such as speech and language practice, comprehension and reflection exercises, and interactive slide presentations. Teachers can also use Screencastify to record professional development trainings, lesson plans, and parent communication.
Screencast-O-Matic https://screencast-o-matic.com/	A free online screen capture tool. This tool records a designated area of your screen as well as audio and webcam input. This tool can be used to record and edit narrated presentations or demonstrations, and produce the recordings as videos for online courses.
Teach Engineering https://www.teachengine ering.org	A digital library of more than 1500 K-12 STEM curricular items such as lessons, hands-on activities, maker challenges and living labs. It is an easy and accessible tool for all educators to bring engineering into their classroom.
TED https://www.ted.com/	TED is a nonprofit devoted to spreading ideas, usually in the form of short, powerful talks. TED stands for Technology, Entertainment, Design. TED Talks are influential videos from expert speakers on education, business, science, tech and creativity, with subtitles in 100+ languages.

PLATFORM	DESCRIPTION
TED-ED https://ed.ted.com/	TED-Ed — TED's youth and education initiative — aims to spark and celebrate the ideas and knowledge-sharing of teachers and students around the world. TED-Ed Originals are a signature content: short, award-winning animated videos about ideas and research that spark the curiosity of learners everywhere. The TED-Ed Clubs program supports students in discovering, researching, exploring and presenting their big ideas in the form of short, TED-style talks. The TED-Ed platform allows users to take any TED Talk, TED-Ed Lesson or educational video and easily create a lesson plan of customized questions and discussions. Users can then distribute these lessons, publicly or privately, and track their impact on the world, a class or an individual student.
Tricider https://www.tricider.com/	A website that offers a free brainstorming and voting platform (a "social voting tool") to help people make decisions. It offers a platform on which teacher and students can brainstorm together and find solutions either if they are or aren't together in the classroom. The teacher can put a question in the appropriate box and then select students eligible to comment and vote. Everyone can propose ideas either anonymously or with his/her name.
Vimeo https://vimeo.com/	A hosting, sharing, and services platform, and an optimized online video streaming and sharing website that allows users to view, upload, share and promote their videos with a high degree of customisation.
Vooks https://www.vooks.com/	A streaming library of animated children's books designed to inspire the love of reading. It is a carefully curated, ad-free platform that promotes a balanced approach to literacy with read along animated storybooks that help support development and create engagement with students.
WordArt.com https://wordart.com/	An online word cloud art creator that enables users to create amazing and unique word cloud art with ease. No prior knowledge of graphic design is required.
Wordwall https://wordwall.net/	Templates for different games and activities such as quizzes, match ups, unjumbles, matching pairs, random wheels, rank orders, true or false, labelled diagrams, etc. Pick a template, enter your content, and print or play on screen.

CHAPTER 9

A TRIBUTE TO THE FACTIVE PROJECT

The flipped classroom handbook would never have been created without the FACTIVE Erasmus+ KA2 project. FACTIVE is an abbreviation for Flipped Classroom Training Approach for Clothing and Textile Innovative VET Education. We are grateful not only for the financial support but also the moral support for individuals involved in teaching and also those who are interested in the continuous reinvention of the teaching practice. The FACTIVE project plan reflects the situation and needs of the European textile and clothing industries. The project also includes teachers from a variety of backgrounds and experience. The flipped classroom handbook attempts to introduce flipped classroom methodology with vivid teaching examples from various educational settings and levels. As other FACTIVE project results offer learning materials for the textile and clothing industry specifically, the flipped classroom handbook offers learning materials for teachers regardless of the educational level of their students.

You might be curious about the FACTIVE project. The following is a brief presentation of the project. Traditionally, our training systems are based on knowledge and skills that are transferred by a trainer to a student. Think of the teacher with a textbook at the front of the classroom, think of the consultant / trainer with a PowerPoint presentation in the training room, think of the instructor, with a manual in hand, explaining to a new employee how to operate a machine.

In all these situations, the student is the recipient of knowledge, and is expected to practice what they have learned to the best of their ability. Of course, the student can ask questions and is assisted when necessary, but the starting point remains the training offer as mastered and provided by the teacher or trainer. Demand-oriented training reverses the roles. The starting point is no longer the training offer, but the situation of the student and the competence deficits as he/she experiences. The hypothesis is that responding in a targeted manner to the questions and needs of the student

would increase training effectiveness, save time and reduce costs. For example, in order to teach the team of a pattern department to work with a new version of CAD software, in our old logic it is almost natural to collectively free half a day for a thorough explanation by an IT specialist from the software supplier. This would then be followed by some exercises, and a question hour to conclude. Demand-oriented training, however, starts at question time. Indeed, each student has a different starting position, the learning rhythm and the assimilation of new contents can vary widely. One trainee will need just a few tips to use the new software, for another trainee, starting from scratch is sometimes the best option (FACTIVE, 2021).

The FACTIVE project, which is carried out by an international team of training experts on the one hand and experts from the textile and clothing sector on the other, is looking for the best formula to concretize and implement demand-oriented training. In the first step, the FACTIVE project conducts field research of the most relevant training needs in the textile and clothing industry. In the second step, the FACTIVE project has created this flipped classroom handbook with ideas on implementing the flipped classroom approach to teaching practice. The Flipped Classroom Handbook is complemented by the FACTIVE Handbook, which explains the guidelines for textile and clothing VET teachers and trainers on adopting the FACTIVE approach, organising learning activities, and evaluating learning outcomes. A possible way to deliver the FACTIVE project is to develop an open online course focused on sustainability in the textile and clothing industry, which is one of the key topics for present and future developments. All the learning and teaching materials developed under the FACTIVE project framework go through piloting and testing in teaching practice, resulting in a Compendium of Pilot Testing. As a committed networker, the FACTIVE project also informs those who are interested and have a stake in this type of learning with relevant news and events.

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