

INNOVATIVE
AND TECHNOLOGY-ENHANCED
TEACHING AND LEARNING

TEACHER'S HANDBOOK



Co-funded by the
Erasmus+ Programme
of the European Union





Co-funded by the
Erasmus+ Programme
of the European Union



ERASMUS+ PRINTEL PROJECT “CHANGE IN CLASSROOM: PROMOTING INNOVATIVE TEACHING
& LEARNING TO ENHANCE STUDENT LEARNING EXPERIENCE IN EASTERN PARTNERSHIP COUNTRIES”

INNOVATIVE AND TECHNOLOGY ENHANCED TEACHING AND LEARNING: **ACTIVE LEARNING IN THE FLIPPED CLASSROOM**

Contributors:

Peter Dalenius (LiU)
Serob Khachatryan (YSU)
Alena Charnavokaya (BrSTU)
Boris Gitolendia (GTU)
Ia Jimshitashvili (TeSaU)
Kanstantin Smatrytski (YKSUG)

PRINTeL 2020

European Commission support for the production of this publication does not constitute an endorsement of the contents, which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Forword

The current Handbook is developed within the frames of Erasmus+ PRINTeL project aimed at promoting innovative teaching and learning (T&L) pedagogies in Eastern Partnership Countries (EPC) - Armenia, Georgia and Belarus. The project contributes to enhancing student real-life learning experience by introducing a major change in the classroom via interactive and technology-enhanced T&L practices. The training of the university teaching staff on new, interactive T&L methods and approaches is on PRINTeL target as well.

The expertise and experience of EU and EPC universities participating in the project have served as a basis for this Handbook development. It compiles the materials of PRINTeL training of trainer (TOT) workshops held at 5 EU partner universities, which later were fine-tuned by EPC university trainers based on their 100 in-house teacher trainings (TT) experience.

The Handbook consists of five chapters, each devoted to a certain T&L method and/or strategy, as follows:

Through the material, experience and best practices accumulated in this manual, the Handbook delivers general knowledge on the use of active T&L pedagogical methods mentioned above, suggests practical tips for teachers and trainers, offers methodological patterns applied in students teaching and teachers training and provides a depository of resources on the specified innovative T&L methods.

Each T&L method in this Handbook is described in detail and advices on advantages and challenges of each are offered. The Handbook allows the users to set the pace of their learning, as well as the depth to which they strive in relation to each method.

The present Handbook aims to offer support both for university teachers who themselves want to learn more about active learning methods and for trainers who train their colleagues on the use of these methods. The proposed activities can be undertaken individually, jointly with a few peers or in a more

formal training group. In case of group training, the trainer decides which resources listed in the Handbook to apply. Individual learners can make their own selection of provided material.

Readers interested in being engaged in virtual communities and discussion groups of various teaching practices, as well as seeking for additional Open Educational Recourses (OER) for their practice are kindly invited to get registered and become a member of the **Virtual Academy of Teaching and Learning (VATL)** at www.vatl.y-su.am, - an online platform and a depository of OERs for the teachers and students interested in innovative and technology enhanced T&L.

Armen Budaghyan

Yerevan State University

Coordinator of the PRINTeL project

PRINTeL PROJECT PARTICIPANTS

The following institutions from EPC and EU countries are involved in the project consortium:

Eastern Partnership Country institutions:

- Yerevan State University (YSU), Armenia - Coordinator of the project
- National Polytechnic University of Armenia (NPUA), Armenia
- Vanadzor State University after H. Tumanyan (VSU), Armenia
- Ilia State University (ISU), Georgia
- Georgian Technical University (GTU), Georgia
- Iakob Gogebashvili Telavi State University (TeSaU), Georgia
- Belarusian State University (BSU), Belarus
- Brest State Technical University (BrSTU), Belarus
- Yanka Kupala State University of Grodno (YKSUG), Belarus

Social partner:

- National Center for Strategic Research in Higher Education (NCSRHE), Armenia

EU partner institutions:

- Katholieke Universiteit Leuven (KU Leuven), Belgium
- Universitat de Barcelona (UB), Spain
- Universidade do Porto (U.PORTO), Portugal
- Linköping Universitet (LiU), Sweden
- FH Joanneum Gesellschaft mbH (FHJ), Austria

For further information about the PRINTeL project please visit the project's website on www.printel.am.

TABLE OF CONTENTS

PART 1		
DESCRIPTION OF THE METHOD	11	
PART 2		
FOUNDATIONS AND PRINCIPLES	15	
2.1. The Four Pillars of Flipped Learning.....	16	
2.2. Flexible Environment.....	16	
2.2.1. <i>Learning culture</i>	17	
2.2.2. <i>Intentional content</i>	17	
2.2.3. <i>Professional educator</i>	17	
2.2.4. <i>Five steps to flip your class</i>	17	
2.3. Principles for Designing Flipped Learning.....	19	
2.4. Pedagogical Perspectives.....	19	
2.4.1. <i>Using the pedagogical perspectives</i>	21	
2.5. Examples of Active Learning Techniques.....	21	
PART 3		
TEACHER’S ROLE IN THE FLIPPED CLASSROOM	23	
3.1. Discussion Questions for Flipped Classroom.....	26	
3.2. Types of Questions.....	27	
3.3. Critical Thinking Questions for Flipped Classroom.....	29	
PART 4		
BEFORE AND DURING THE CLASS	31	
4.1. Activities of the Teacher and Student <i>before</i> Classes.....	33	
4.2. Activities of the Teacher and Student <i>in</i> Classes.....	36	
PART 5		
ASSESSMENT STRATEGY	41	
5.1. Our Understanding of Innovation Pedagogy.....	42	
5.2. How Can We do It?.....	43	
5.3. What is Assessment for Learning?.....	45	
5.4. There is no “Competence Assessment Tool”.....	49	
PART 6		
POTENTIAL BENEFITS	51	
6.1. Choose Your Time and Place.....	52	
6.2. No Need to be in a Hurry.....	52	
6.3. Psychological Condition of Student.....	53	
6.4. Less Mistakes.....	53	
6.5. What’s in it for the Lecturer?.....	54	
PART 7		
POTENTIAL CHALLENGES AND TIPS	55	
REFERENCES	60	

PART 1

DESCRIPTION OF THE METHOD



The *flipped classroom* approach seems to imply a radical change in teaching already in the name. In some cases, everything might be turned upside down, but the main point is really to make the most of the time that the teacher and the students spend together.

“[...] flipped learning occurs when information that was traditionally delivered directly to the entire classroom, via lecture, is delivered outside of the classroom space, typically online, in digital or video format” (Roehling, 2018).

Instead of passively listening together in large lecture halls and then go home to work individually on exercises, students now individually prepare e.g. by watching pre-recorded lectures, using in-class time for active learning that stimulates higher-order thinking. The transformation is illustrated in Figure 1 below.

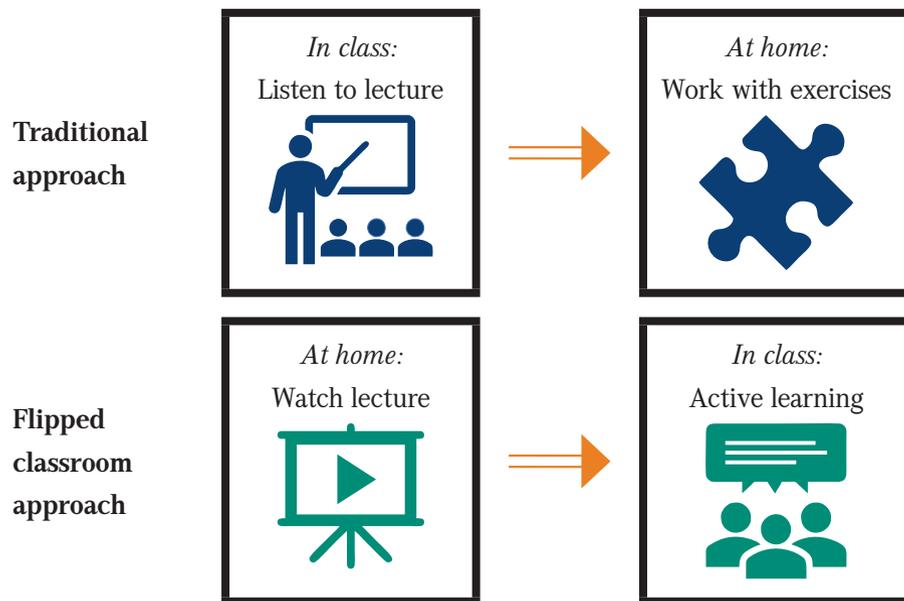


Figure 1. Traditional vs. Flipped Classroom Approach

Flipped classroom, flipped learning, or sometimes inverted classroom, has been around for some twenty years now and has to some extent become synonymous with pre-recorded lectures, but this is not the main feature of the approach. The students can prepare for class activities by reading, doing quizzes, completing assignments, etc. The most important factor is the active learning taking place during class.

So, what is *active learning* then? It is anything that involves students in *doing* things and *thinking* about the things they are doing, according to Bonwell and Eison (1991) who more or less coined the term. General characteristics of active learning include:

- a) Students are involved in more than listening;
- b) Less emphasis is placed on transmitting information and more on developing students' skills;
- c) Students are involved in higher-order thinking (analysis, synthesis, evaluation);
- d) Students are engaged in activities (e.g., reading, discussing, writing);
- e) Greater emphasis is placed on students' exploration of their own attitudes and values;
- f) It requires externalizing cognitive processes in the activities.

The last one was added by Matsushita (2018), otherwise the list is identical to Bonwell and Eison's original list.

This broad definition means that active learning is not really a method in itself. It is rather an overarching approach or philosophy common to many different pedagogies. As observed by Cattaneo (2017), active learning is an ingredient in problem-based learning, project-based learning, case-based learning, research-based learning, discovery-based learning, and indeed several other methods. This versatility does not mean that active learning is without theoretical foundation. The basic idea is that knowledge is generated through student activity, which corresponds well with the constructivist framework.

PART 2

FOUNDATIONS AND PRINCIPLES



Numerous guidelines for flipping the classroom and using active learning methods exists, and this section summarizes some of their recommendations.

2.1. The Four Pillars of Flipped Learning

The Flipped Learning Network (FLN, 2014) defines four pillars on which the flipped classroom approach, or flipped learning, rests (see Figure 2).

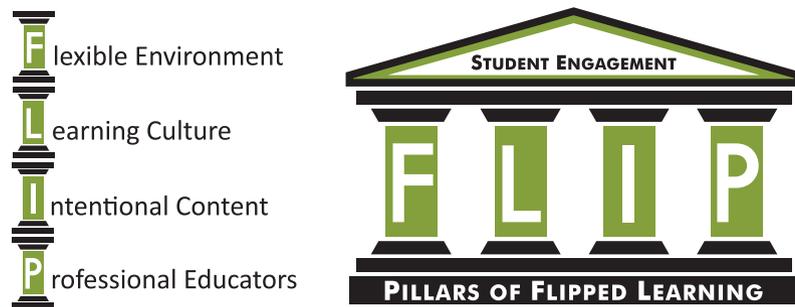


Figure 2. The four pillars of flipped learning

<https://flippedlearning.org/syndicated/>

[11-indicators-of-excellence-in-instruction-flipped-or-otherwise/](#)

2.2. Flexible Environment

Flipping the classroom is not just about planning activities differently, it also means that the physical environment needs to be flexible enough to allow for many different in-class activities. Classical lecture halls where all eyes are directed towards the podium does not support active flipped learning. You need to at least be able to rearrange the furniture.

2.2.1. Learning culture

Flipped learning implies a shift from teacher-centered teaching to student-centered learning. Students are encouraged to be more actively involved in knowledge construction in a way that is personally meaningful.

2.2.2. Intentional content

Pre-class activities should be designed to help students develop conceptual understanding. This does not mean that the teacher should completely leave the students to browse anything online. All content should be chosen or produced carefully to support the learning outcomes of the course.

2.2.3. Professional educator

Student-centered learning does not diminish the role of the teacher. A professional educator needs to be active during class, providing students with relevant feedback at just the right time, always reflecting on how to improve their practice.

2.2.4. Five steps to flip your class

Faculty Innovation Center at the University of Texas at Austin (2020) has defined five concrete steps for flipping your class. For an overview of their way of explaining the flipped classroom, see also *Figure 3* below. The following steps are further discussed in chapter 4. Before and during the class.

Step 1: Identify where the flipped classroom model makes the most sense for your course

If you are new to flipped classroom, it might be a good idea to start small, maybe just by flipping a single lecture. The flipped classroom approach might make more sense in some courses, so try to identify a course, or a part of a course, that seems suitable.

Step 2: Spend class time engaging students in application activities with feedback

Class time should not just be unsupervised group work. Your role as a teacher is still important and you need to find activities that will activate students and keep them engaged in the topic.

Step 3: Clarify connections between inside and outside of class learning

The teacher must have a clear idea of what the students' need to know in order to be able to participate in the active learning class.

Step 4: Adapt your materials for students to acquire course content in preparation of class

It does not have to be in the form of recorded lectures, if it is a well-defined material that will support student engagement.

Step 5: Extend learning beyond class through individual and collaborative practice

The teacher also must have an idea of what happens after class, e.g. completing started assignments or use discussion boards to elaborate on ideas.

2.3. Principles for Designing Flipped Learning

Roehling (2018) presents a list of principles for an optimum flipped learning experience:

1. Provide an opportunity for students to learn the foundational information outside of the classroom;
2. Hold students accountable for pre-class preparation;
3. Assess pre-class and in-class learning;
4. Provide well-defined and structured guidance to students during in-class activities;
5. Make clear connections between in-class activities, pre-class materials, and learning objectives and goals;
6. Allow enough time for students to complete the in-class assignments;
7. Maximize opportunities for faculty to interact with students;
8. Give one free pass to students who do not complete the pre-class assignments.

2.4. Pedagogical Perspectives

Flipped classroom has been widely adopted in higher education, but the theoretical foundation is still lacking. In an effort to rectify this, Koh (2019) analyzed 51 case studies of flipped classroom use in higher education and suggests four pedagogical dimensions that can be used to articulate how flipped classrooms support student-centered learning.

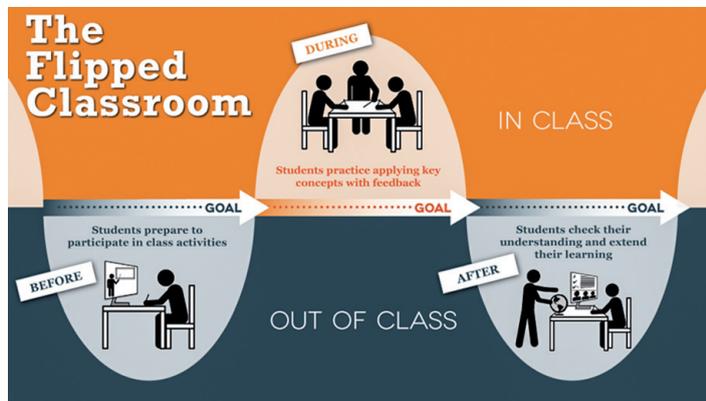


Figure 3. Snapshot of a flipped class

<https://facultyinnovate.utexas.edu/how-to-flip>



Personalization

Students should be able to choose between different resources and learning activities, thus personalizing their learning experience. For pre-class activities, this means that the teacher needs to supply different versions of the material, adapted to fit different study modes. Using material available online, in the form of Open Educational Resources (OER), facilitates the preparation. Personalization can also be accomplished during in-class activities, if the structure is flexible enough to support individual learning needs. Flexible learning environments can be another contributing factor.



Higher-order thinking

By flipping from lectures, with a focus on passively transmitting knowledge, to active learning, learning outcomes can be formulated on higher levels in Bloom's taxonomy: application, analysis, creation. Students can be engaged in problem-solving using real-world problems, case studies or scenarios.



Self-direction

Students should be encouraged to take responsibility for their own learning process. Connected to the aspect of personalization, student autonomy should be fostered, giving students a better understanding of their role as independent learners.



Collaboration

Collaboration can be so much more than just group work. It supports active learning and helps the students articulate their personal knowledge. The social interaction enhances students' motivation and provides a suitable context for efficient knowledge construction.

2.4.1. Using the pedagogical perspectives

As teachers, we can be inspired by the analysis of Koh and use her questions to guide our design of flipped learning:

- Personalization: How are individual choices for learning supported?
- Higher-order thinking: How is students' higher-order thinking elicited?
- Self-direction: How are students supported to take charge of learning?
- Collaboration: How are learning collaborations among students supported?

2.5. Examples of Active Learning Techniques

Using active learning in the classroom does not necessarily have to involve a lot of preparation and complicated technology. As O'Neal and Pinder-Grover has shown, teachers have a vast spectrum of possible active learning techniques available – some very simple and some more complex. Simple examples include:

- **Clarification pauses:** Simply pause for a minute after introduction of a new concept, then ask if anyone needs clarifications.
- **Think-Pair-Share:** Ask the students to work individually on some task for a few minutes and then compare their results with a partner, trying to form a common solution that can be shared with the whole class.

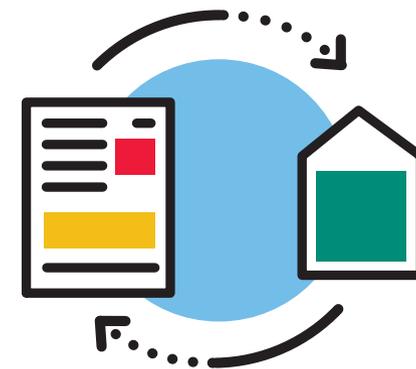
Some more complex examples include:

- **Role playing:** Instruct different groups of students to represent different roles or standpoints. Then have them act out a scenario, scripted or improvised. Remember to always follow up with a debriefing session.
- **Jigsaw discussion:** Divide a general topic into smaller pieces. Each student in a group is given a particular area for research. Later on, students will share their findings with the whole group, thus completing the puzzle.

Several more examples can be found in *How Can You Incorporate Active Learning Into Your Classroom?* available from University of Michigan, Center for Research on Learning and Teaching.

PART 3

TEACHER'S ROLE IN THE FLIPPED CLASSROOM



demonstrate what it means to be a learner: the teacher is the lead learner in a classroom. Teachers should show students what adults do when they do not know an answer, teach them how to collaborate, and guide them through the vast ocean of information in which we swim in our interconnected world.

The teacher must be able to flow through a class period in a nonlinear fashion. All the students are at different places in their mastery and understanding of the learning objectives, and it is the role of the teacher to meet each student where she or he is. The mastery model hinges entirely on the teacher meeting the student at the point of need, not the student meeting the teacher at the prescribed place in the curriculum.

The teacher must be able to relinquish control of the learning process to the students. Control freaks need not apply.

3.1. Discussion Questions for Flipped Classroom

In flipped classroom class time is a learning experience for the student, not a download and upload of knowledge. In this context the use of questions and discussions is of critical importance.

Nobel Prize winner Isidor Rabi was once asked, “Why did you become a scientist and not for instance a doctor, a lawyer or a businessman?” He answered back, “My mother made me become a scientist. The mothers of my mates were usually asking their kids “What you learned in the school?”, whereas my mother was asking a completely different question, as to “what good questions did you ask today in the school?” So, I became a scientist as a result of asking good questions every day.

In the course of recent years, the education experts specifically recognize the exceptional role of questions on the quality of education. The issue is that

in contrast to giving ready knowledge, or affirming or rejecting statements, the questions move both the students and the teachers to think. Indeed, the questions move the human mind and increase the motivation to study. These make the individual to do research for getting answers on permanent basis. In addition to promoting the thinking, the questions help the teacher to understand as to what extent the students learned the topic.

The researches of the recent years (Tofade, Elsner, Haines, 2013) prove that when asking questions, the teacher should give at least 30 seconds to the students before calling on them. According to the researches, in the given circumstances the students can think and memorize the question. Due to this method the number of students who can pick up the questions increases.

The efficient use of questions can essentially improve the efficiency thereof. For instance, rather than asking “which numbers are called simple?” the teacher should ask “why 17 is a simple number, whereas 15 is not?”

There exist numerous types of questions. Unfortunately, the hornbooks and class processes predominantly use factual questions: *What? When? Who?* The value of these questions is very low.

Below we present other types of questions, which promote development of thinking of the students in the flipped classroom.

3.2. Types of Questions

Clarifying questions

1. What do you mean? ...
2. Can you bring an example? ...
3. How does it help? ...
4. You are using the word in what meaning?

Questions about justifications

1. Why do you think that? ...
2. How do you know that? ...
3. What are your justifications? ...
4. Do you have any facts? ...
5. What examples can you use? ...

Questions about viewpoints and alternatives

1. How can you reformulate your statement?
2. Any other opinion? ...
3. What if someone suggests something like that?
4. What will a person say who does not agree with your point?
5. Which are the differences of these questions?

Questions about the consequences

1. What is following from what you said?
2. Is it in line with what you said before?
3. What are the consequences?
4. Is there a general rule?
5. How can you check whether your statement is right or wrong?

Questions about questions

1. Do you think that it is a relevant question?
2. What does the question mean?
3. How can the question help us?
4. Can you think of another question, which will open a prospect for another question?

3.3. Critical Thinking Questions for Flipped Classroom

The Teach Thought organization developed 28 critical thinking questions, which teachers can use during flipped class discussions (TeachThought, 2017):

1. What evidence can you present for/against...?
2. How does ... contrast with ...?
3. How could you outline or concept map...? Explain your response with examples.
4. Why is ... significant? Explain your reasoning.
5. What are the advantages and disadvantages of ...?
6. What is the point or “big idea” of ...?
7. How could you judge the accuracy of ...?
8. What are the differences between ... and ...?
9. How is ... related to ...?
10. What ideas could you add to ... and how would these ideas change it?
11. Describe ... from the perspective of ...
12. What do you think about ...? Explain your reasoning.
13. When might ... be most useful and why?
14. How could you create or design a new...? Explain your thinking.

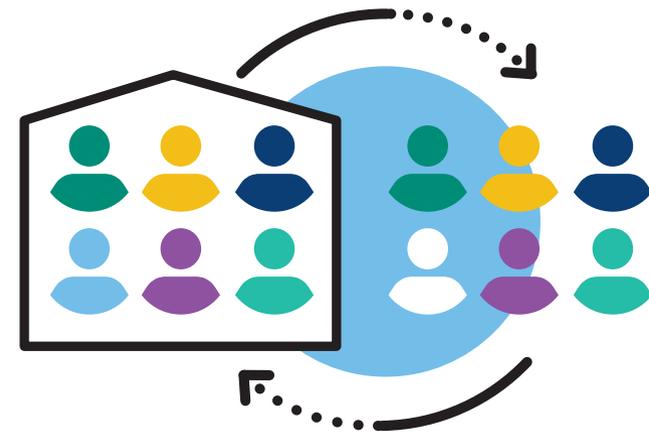


Figure 5. Question mark

By Alexander Henning Drachmann from Esbjerg, Denmark - Question mark in Esbjerg, CC BY-SA 2.0, <https://commons.wikimedia.org/w/index.php?curid=34722094>

15. What solutions could you suggest the problem of ...? Which might be most effective and why?
16. What might happen if you combined ... and ...?
17. Do you agree that ...? Why or why not?
18. What information would you need to make a decision about ...?
19. How could you prioritize ...?
20. How is ... an example of ...?
21. What are the most important parts or features of ...?
22. Which details of ... are most important and why?
23. What patterns do you notice in ...?
24. How could you classify ... into a more/less general category?
25. What makes ... important?
26. What criteria could you use to assess ...?
27. How could ... and ... function together? How do they work separately and together and different ways?
28. Where is ... most/least ...? Explain your reasoning.

PART 4
**BEFORE AND DURING
THE CLASS**



The flipped classroom model swaps lower and higher types of cognitive activity according to Bloom's taxonomy (Anderson et.al., 2001). At home, students apply:

- ✓ remembering – retrieving relevant information from long-term memory;
- ✓ understanding – determining the meaning of instructional messages.

Class activity is aimed at the use of higher types of cognitive activities:

- applying – carrying out or using a procedure in a given situation;
- analyzing – breaking material into its constituent parts and detecting how the parts relate to one another;
- evaluating – making judgments based on criteria and standards;
- creating – putting elements together to form a novel, coherent whole or making an original product.

In a flipped classroom, students study the topic on their own before the lessons begin. In the classroom, they apply the acquired knowledge, discuss complex problems and solve practical tasks (see Figure 6).

Type of Learning	Before class	During class	After class
Tradition learning	 Students relax	 Students listen to a teacher	 Students do homework
Learning in the flipped classroom	 Students study the topic on their own	 Students apply the knowledge by solving problems and doing practical tasks	 Students use knowledge and skills to solve more complex tasks

Figure 6. Difference between traditional learning and learning in the flipped classroom

4.1. Activities of the Teacher and Student *before* Classes

In the flipped classroom, preparing students for classes is of great importance. Success depends on both the teacher and the students.

Teacher

To use the technology of the inverted class, the teacher has to change his teaching modules (see Figure 7) as suggested by Faculty Innovation Center at the University of Texas at Austin (2020).

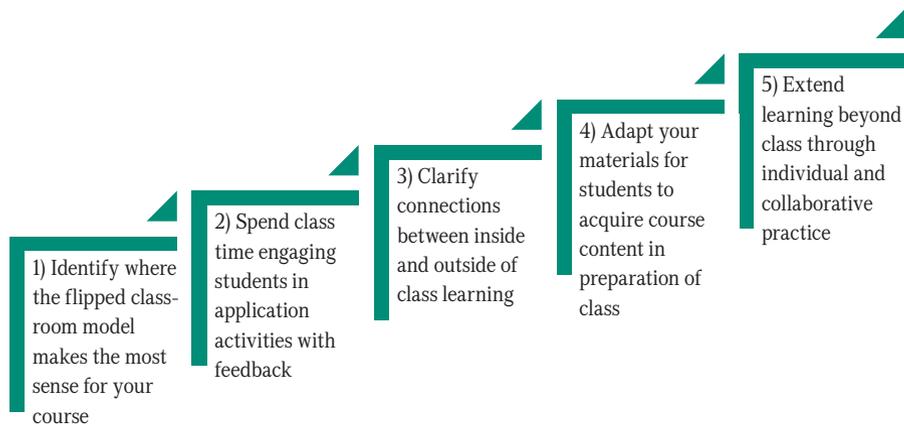


Figure 7. Five steps to try flipped classroom

Step 1. The teacher should apply training, if the topic is difficult to understand, students need the help of a teacher in mastering the teaching material, students need to gain practical experience on this topic.

Step 2. The most important question is how to use class time effectively. Students should be involved in the topic of discussion, actively participate in class work. For each group of students, it is necessary to select individual activities depending on their age, interests, level of erudition, sociability, group cohesion and more.

Step 3. In the flipped model, teachers decide:

- What students should *study at home*. The teacher gives students in advance educational material on the topic of the lesson. This can be lecture texts, video materials, links, and more.
- What students will *do in class*. It is important to use the tools of active learning, involve students in the discussion of problematic issues, and get feedback.
- What students will *do after class*. The teacher may offer students to complete a more difficult task. But he must take into account that

students will perform this task at the same time as preparing for the next lesson.

Step 4. The teacher has to adapt the teaching materials so that students can study them on their own. This makes new demands on the structure of texts, their visibility, comprehensibility. Modern students are focused not on reading, but on viewing various content. Consequently, the gradual transition from the traditional presentation of materials to digital will help students better understand the material.

The teacher also informs students that preparing for the lesson is mandatory. The student must have contact with the teacher by e-mail or another contact. An untrained student will not be able to benefit from classroom activities.

Step 5. Ways of spreading active learning outside the classroom are important. Students should understand how they can apply their knowledge and skills to solve problems in other projects and areas.

The teacher has to apply new teaching methods and tools, move from traditional learning to digital learning. This change should take place step by step, which will allow both students and teachers to adapt to changes.

To work in a flipped class, the teacher adjusts the methods:

- from traditional learning to active learning;
- from traditional education to digital education.

Students

Before classes, students should study the material provided by the teacher, understand it, watch videos, links to Internet resources, and make a list of questions that they can discuss in the classroom. In this model of learning, the student is not a passive student, but actively participates in the learning process to the classroom. He will not be able to achieve good results if he does not prepare for the lesson in advance.

4.2. Activities of the Teacher and Student *in* Classes

In the classroom, the teacher does not give a lecture, but organizes a discussion in groups, solving a practical situation, applying a problematic approach to teaching and other types of active learning.

A suggestion for structuring the session could be in the form of the following components (see Figure 8).

The teacher conducts a preliminary assessment of the student's knowledge that he acquired before class. Students do the test (3-4 questions). Verification can be carried out in different ways:

- students exchange papers and check each other;
- students do a self-test;
- the teacher instantly checks with digital programmes.

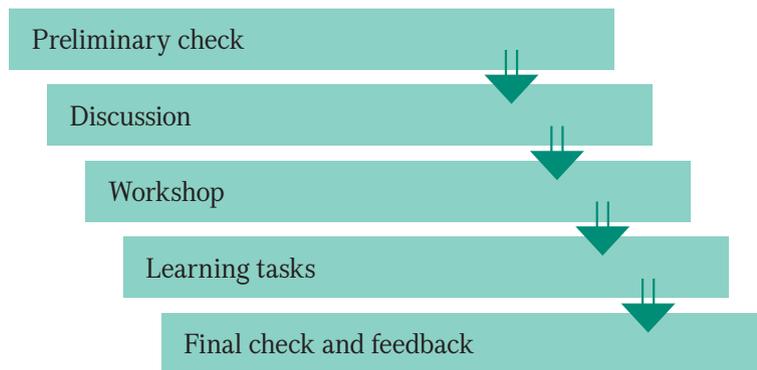


Figure 8. Class structure in flipped classroom

One way of designing a course module and choosing the appropriate activities is to use the ABC Learning Design method developed by Young & Perovic (2018), based on the learning types identified by Laurillard (2012). The teacher can start by thinking about the six general types of learning activities, deciding which methods are suitable for the particular course. These activities and some suggested activities, both digital and more conventional, are listed in Figure 9.

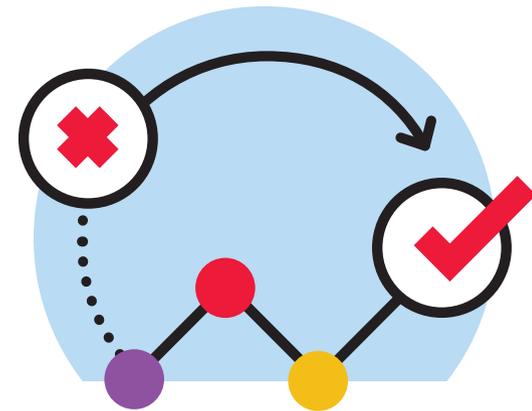
Type of activity		Conventional methods	Digital technology
Acquisition	Learning through acquisition is what learners are doing when they are listening to a lecture or podcast, reading from books or websites, and watching demos or videos	<ul style="list-style-type: none"> • reading books, papers • listening to teacher presentations face-to-face, lectures • watching demonstrations, master classes 	<ul style="list-style-type: none"> • reading multimedia, websites, digital documents and resources • listening to podcasts, webcasts • watching animations, videos
Collaboration	Learning through collaboration embraces mainly discussion, practice, and production. Building on investigations and acquisition it is about taking part in the process of knowledge building itself	<ul style="list-style-type: none"> • small group project • discussing others' outputs • building joint output 	<ul style="list-style-type: none"> • small group projects using online forums, wikis, chat rooms, etc. for discussing others' outputs • building a joint digital output

Type of activity		Conventional methods	Digital technology
Discussion	Learning through discussion requires the learner to articulate their ideas and questions, and to challenge and respond to the ideas and questions from the teacher, and/or from their peers	<ul style="list-style-type: none"> • tutorials • seminars • discussion groups • class discussions 	<ul style="list-style-type: none"> • online tutorials • seminars • email discussions • discussion groups • discussion forums • web-conferencing tools, synchronous and asynchronous
Investigation	Learning through investigation guides the learner to explore, compare and critique the texts, documents and resources that reflect the concepts and ideas being taught	<ul style="list-style-type: none"> • using text-based study guides • comparing texts • analysing the ideas and information in a range of materials and resources • using conventional methods to collect and analyse data • searching and evaluating information and ideas 	<ul style="list-style-type: none"> • using online advice and guidance • analysing the ideas and information in a range of digital resources • using digital tools to collect and analyse data • comparing digital texts • using digital tools for searching and evaluating ideas and information

Type of activity		Conventional methods	Digital technology
Practice	Learning through practice enables the learner to adapt their actions to the task goal and use the feedback to improve their next action. Feedback may come from self-reflection, from peers, from the teacher, or from the activity itself, if it shows them how to improve the result of their action in relation to the goal	<ul style="list-style-type: none"> • practicing exercises • doing practice-based projects • labs • field trips • face-to-face role-play activities 	<ul style="list-style-type: none"> • using models • simulations • microworlds • virtual labs and field trips • online role play activities
Production	Learning through production is the way the teacher motivates the learner to consolidate what they have learned by articulating their current conceptual understanding and how they used it in practice	<ul style="list-style-type: none"> • statements • essays • reports • accounts • designs • performances • artefacts • animations • models • videos 	<ul style="list-style-type: none"> • producing and storing digital documents • representations of designs • performances, artefacts • animations • models • resources • slideshows • photos • videos • blogs • e-portfolios

Figure 9: Types of activities and suggested methods

PART 5
ASSESSMENT STRATEGY



5.1. Our Understanding of Innovation Pedagogy

A learning approach that defines in a new way how knowledge is assimilated, produced and used in a manner that can create sustainable innovations.

Why the change from traditional pedagogy to innovation pedagogy is needed? Why innovation pedagogy?

- The traditional approaches in HEIs do not provide competences needed in current and future work.
- The job descriptions of young people can change approx. 25 times during their lifetime.
- About 65% of young people today will work in jobs which do not even exist now.
- The most important competences to success in working life will be skills for life-long learning, ability to recognize and assess own learning and ability to develop it.
- The graduates will be successful in their work and life in general, as well as the organizations, where they work, will be successful.
- The graduates will be successful in their work and life in general, as well as the organizations, where they work, will be successful.
- We live in a dynamic environment and need to be able to solve wicked problems such as climate change.



Figure 10. Traditional examination in Curzon Exam Hall

By Azim Khan Ronnie - Own work, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=72708317>

5.2. How Can We do It?

In a flipped classroom, students engage with lectures or other materials outside of class to prepare for an active learning experience in the classroom. One of the many advantages of a flipped classroom is that it provides more time for instructors to work directly with students. Typically, students will do either some form of reading assignment or watch a video or a screencast online to prepare for the in-class portion of the flipped class. Depending on the learning objective(s) of the flipped class, students may need to read an article, book chapter or website to prepare for the in-class activities. In some cases, students are solving problems and analyzing information. They are working in small groups, talking together, and moving around. The instructor interacts and guides but does not lecture. In fact, no one has lectured to these students in weeks. (For a more detailed description of the method what a flipped classroom is and what in-class, activities are possible see in chapter 1. Description of the method).

While the flipped classroom does seem to have many advantages, it also contains challenges that may hinder student performance. One of the main issues is how can we be sure that the students completed the out-of-class work? More importantly, how do we make sure that the students have learned what they were supposed to learn online? Instructors using flipped lessons must be careful to plan and structure the environment to support student learning.

A key to achieving this is assessment¹. Taking into consideration that flipped learning is more decentralized and personalized than a traditional course design, the challenge is to have assessments that provide reliable, actionable information about student learning in the various phases of flipped learning that is as up to the minute as possible. Armed with this knowledge about student learning, instructors can provide just the right amount of support at just the right time, anytime. It is critical for instructors to integrate and relate the learning outcomes, activities, and assessment strategies to ensure that pre-class work supports the in-class work. When designing formative assessment, the following should be considered:

- Will the assessment be worth grades or not?
- How long will the assessment take the students?
- If graded, how long will the assessment grading take the instructor or teaching assistants?
- How frequently should the students be assessed before class?

Once the assessment is completed it is important for the instructor to take the time to go through the responses before class and to review the responses to find similar themes. In class, the instructor can then reiterate the concepts where students had misunderstandings or confusion before starting the in-class activity. In order to properly support student learning, instructors must

1. The word “assessment” comes from the Latin term *ad sedere*, meaning “to sit down beside”. When we assess, it should be as if we are pulling up a chair next to individual students, getting down on their level, and putting ourselves in their corner to give them information that will help them succeed. In a flipped learning environment, the structure of the class puts students in a position to learn in improved ways, but it’s assessment that opens the way to success.

not only consider various modes of student learning for students, but also should consider the various real-life challenges that students typically face.

Flipped classrooms can be powerful, student-centered learning environments, so learn the cutting-edge **assessment strategies** that will enable you to find out just how well your flipped classroom is working.

Teachers that are already flipping their courses or just starting to think about it, have to consider how to assess student learning. Since flipping lessons results in different classroom activities, it takes different assessment approaches to measure the efficacy of these new instructional approaches. They should learn how to effectively measure flipped learning in *Assessment Strategies for the Flipped Classroom*.

5.3. What is Assessment for Learning?

Assessment for learning is best described as a process by which assessment information is used by teachers to adjust their teaching strategies, and by students to adjust their learning strategies.

Assessment, teaching, and learning are inextricably linked as each informs the others. Assessment is a powerful process that can either optimize or inhibit learning, depending on how it is applied.

Why should we use Learning Assessment?

- Provide students with ongoing feedback.
- Provide information about student learning.
- Provide students with opportunities to monitor their learning.
- Help students feel less anonymous in classes.
- Help students understand that learning is an ongoing process.
- Provide evidence that you value your students’ learning experiences.



Figure 11. Students discussing

By VMasrou (WMF) - Own work, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=57743199>

Here are some strategies for flipped learning assessment that can help provide this kind of support.

1. **Active learning techniques** – Allow students to apply concepts in class where they can ask peers or instructors for feedback and clarification. Active learning methods ask students to fully participate in their learning by thinking, discussing, investigating, and creating. In active learning classrooms, students may be asked to practice skills, solve problems, struggle with complex questions, propose solutions, and explain ideas in their own words through writing and discussion. Research indicates that active learning methods are especially effective for student learning, when compared to classes that primarily consist of lecturing.
2. **Collaborative Learning** – There are a number of activities students can do to enhance understanding and provide opportunities to apply knowledge. Collaborative learning can occur peer-to-peer or in larger groups. Peer learning, or peer instruction, is a type of collaborative learning that involves students working in pairs or small groups to discuss concepts or find solutions to problems. Similar to the idea that

two or three heads are better than one, educational researchers have found that through peer instruction, students teach each other by addressing misunderstandings and clarifying misconceptions. With method “Peer instruction” students can teach each other by explaining concepts or working on small problems.

3. **Group work** – If group work is one of the ways you plan on assessing your students, giving them time in class to do their activities alleviates the inconvenience of holding meetings outside of class time (ultimately leading to fewer issues of participation), and gives you a chance to check in on how things are going.
4. **Case Study** – A Case Study tells a real story related to course content. A good case study involves the following elements: tells a real story about an important issue; includes historical information about the case and a dilemma faced by a central character; encourages students to identify a problem as well as support a solution; and encourages students to integrate information and resolve an issue. The purpose is to help students connect information and think holistically about an assigned topic and is aligned with Integration.
5. **Online Quizzes** – There can be many different implementation possibilities for using online quizzes depending on the instructor’s objectives.
6. **Online Discussions** – Similar to quizzes, there are many different ways of incorporating online discussion boards to assess students’ learning. Instructors can give quick and constructive feedback on their contributions, wait to debrief, or continue the discussion in class. Instructor should allow the students adequate time to post their ideas and comments. The instructor can also consider using a “post-first” discussion, so the students can post their ideas without being biased by other students’ postings; the class discussion posts only appear after the student’s first post has been made.

7. **Definitions and Terminology** – Asking questions that focus on the meaning of new words or terminology and that help students to consider the words in more depth can lead to deeper understanding. These questions can either be given to students within an online quiz, or as a question posed to an online discussion board which students can then respond to individually.
8. **Concept Maps** – Concept maps provide a visual representation of connections between concepts that students have learned. These concepts are connected by directional, labeled links to show the relationships between them. Concept maps are excellent tools that can provide instructors with a formative assessment of students' learning and misunderstandings after the online learning activities. For example, the instructor can post an incomplete concept map where students are asked to fill in the blanks to build a complete map that is then submitted to an online drop box where they get feedback on their individual work either online before class or at the beginning of the class.
9. **One Paragraph Summary or Precis Writing** – Ask the students to write and submit a paragraph, a one-page summary, or a précis after an online reading. Students can practice their ability to effectively summarize a longer text, and this also allows the instructor to gauge students' learning, giving them an opportunity to focus on their misunderstandings during class.
10. **Critical Reading** – Ask the students to respond to an assigned reading (research paper, article, book chapter). For example, ask them to reflect on the paper, analyze the information, or criticize and evaluate the ideas. An online drop box, discussion forum, or less formally, a blog can be used to gather their writings and give feedback on their submissions. This can be preparation for discussion with peers in class.
11. **Peer Review/Assessment** – By reviewing their peers' work, students consolidate, reinforce and deepen both their own and their peers'

understanding of the material they learned. This can help students to build critical analysis skills, become comfortable with receiving criticism and justifying their position in further in-class discussions. This activity can be done using an online discussion board or a group drop box in which students all have access to each other's submissions. The instructor will be able to evaluate the students' critiques and their understanding of their peers' work.

12. **What? So What? Now What? Journal** is a brief assessment that can be used at the end of a class session, unit, or course. Students respond to the following questions: What happened in today's class session? What did you learn today? What connections can you make between what you learned today and previous learning experiences? How can you apply what you learned? What would you like to learn more about and how will you learn more about this or a similar topic? The purpose is to determine how students are learning and is aligned with Learning how to Learn.

5.4. There is no “Competence Assessment Tool”

In an ideal situation, we can imagine a device – let's call it a “Competence Assessment Tool” – that connects directly into students' brains that would give a continuous stream of full-spectrum data about student learning and engagement. Of course, no such device exists yet, so the next best thing is to give assessments that are short, frequent, and informative that collect these data for us. For example, classroom response systems can be used effectively to gather in-the-moment data about student learning. Short metacognitive activities, such as one-minute papers, can give a bigger picture. And don't forget that assessment doesn't necessarily mean quizzing or grading. Sometimes simply having students talk through a procedure while you observe them can give you mountains of data about how they are doing.

PART 6
POTENTIAL BENEFITS



These days it's becoming more and more unacceptable to provide old style lectures. Different devices play great role in the teaching process, it is almost impossible to be a lecturer without using different technical devices and incorporating social networks in some way.

The flipped classroom approach is a new method which can and must be used at schools and in higher education as well. It is a new way of thinking for many lecturers, and it is also new for students. It is a vice versa process of typical lectures that may take place for every subject. The main difference is *how* student learns, not just *what* he/she learns. And of course, it is a student-centered approach. This section lists some of the potential benefits of the flipped classroom.

6.1. Choose Your Time and Place

All teachers are aware that the practical questions regarding time and space are important in all learning processes. Flipped learning, however, allows students more freedom regarding when, where and how to study.

6.2. No Need to be in a Hurry

How much time does the student have for listening, understanding, asking questions and answering during a traditional lecture? This varies a lot between different universities, but a typical session might last 45-120 minutes. But what is the attention span of a typical student? How long can students' brains process information efficiently? Is it 15, 20 or perhaps 25 minutes? This means that the rest of the lecture time will simply consist of the lecturer talking for him- or herself.

Flipped learning means that the student will be able to choose the most

convenient time and place (at home, café, university) and take as much time as he/she needs. Also, it allows the student to work with material in their individual tempo, she/he can rewind and replay video and audio material several times, if needed.



Figure 12. Group discussions

By Hebron Geoffrey - Own work, CC BY-SA 4.0,
<https://commons.wikimedia.org/w/index.php?curid=80276883>

6.3. Psychological Condition of Student

A traditional lecture demands a lot from the participants. Students are often tense, desperately taking notes hoping not to miss something important. Sometimes he/she is ashamed to ask questions, not wanting to look like a fool for not understanding.

One important aspect of the flipped learning approach is to create a learning culture of active students, taking responsibility for their own learning. It might not be easy at first, but ultimately the students will be much freer and calmer.

6.4. Less Mistakes

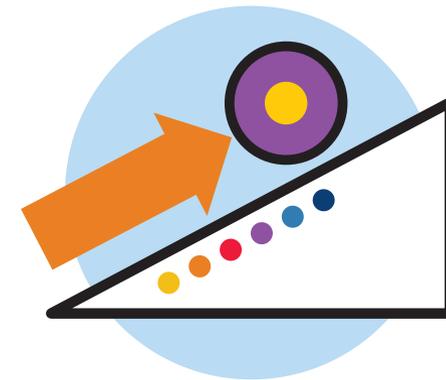
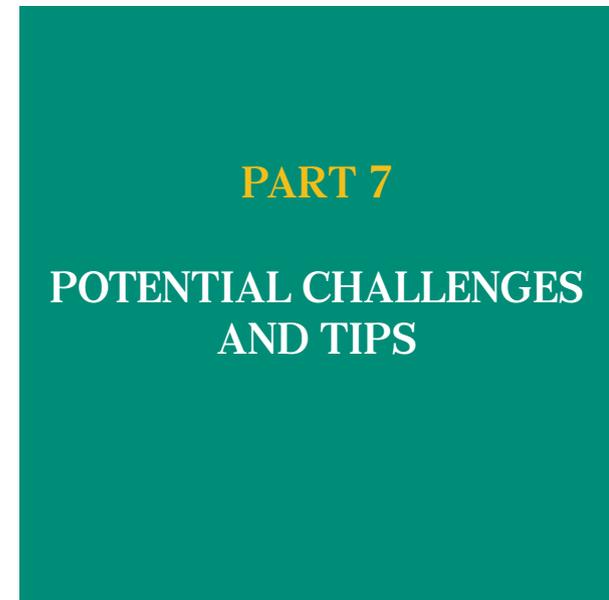
With a traditional approach with large lectures and individual homework, the student will to some extent be left on their own, without access to expertise

during their most active phase. This can create confusion, insecurity and might lead to mistakes that can be hard to detect and correct.

Using the flipped learning approach, this can be improved by having quick help of lecturer, by identifying of mistakes and giving a right advice.

6.5. What's in it for the Lecturer?

Teachers switching to a more active flipped learning approach might feel like they are not needed anymore, at least not once they have recorded their lectures. However, it is important to remember that lecturers are not robots, mindlessly repeating every semester the same text for different students. With the flipped learning approach, the teacher can be so much more: a leader, a coach, a friend. And they coordinate and plan for out-of-class activities, ensure delivery of needed material and tools. Teachers transform old monotonous processes using new, interesting and exciting methods.



What are the biggest challenges or problems in using flipped education and tips for dealing with them? Let's say the teacher decided to introduce flipped classroom methods into his practice. It is natural to assume that he will encounter certain difficulties along this way. Now let's try to consider at least some of them and suggest ways to overcome these difficulties.

1. The creation of a whole course based on the use of flipped classroom is a rather laborious task that requires a lot of time and certain skills from the teacher. This may result in rejection of the very idea of using this technology.

Tip: Try to choose a small part of your course and apply flipped classroom only for the selected part. To create your first videos, use the simplest tools, such as PowerPoint, and not some advanced software.

2. In contrast to the traditional lecture, it is rather difficult to make changes to the prepared video materials. A mistake or shortcoming made by a teacher during a traditional lecture is not difficult to correct. If the material is prepared and issued to students in advance, then any changes are costly.

Tip: This is really a problem. And a reason to prepare materials of as high quality as possible. For example, be prepared for the fact that when recording even a small video clip, you will need significant preparatory work and a large number of tries.

3. Using a different teaching technology may be uncomfortable for some students. It will be hard for some of them to switch from the traditional approach for learning to such a method of training, where they will have to do a lot of independent work. In addition, some students are used to working on their own and spending a lot of time in group discussions is not easy for them.

Tip: There is no ideal teaching methodology that would suit everyone. Of course, when working, individual characteristics of students should be taken into account. Note that the effectiveness of flipped learning will be higher for those student groups that have used this technology in previous courses or subjects.

4. It's quite possible that not all students have equal technical capabilities. Some of them may not have a computer or access to the Internet with sufficient speed. Some students may not have the proper skills for working with electronic devices.

Tip: The solutions in this situation is issuing of materials to students using electronic devices such as flash memory sticks or DVDs. Also, students may be allowed to use computer classes for training, where they can work after school hours. In such a situation it's also important, that students do not feel the difference in the teacher's attitude to them, if they do not have any particular teaching aids.

5. All students are different. And the motivation of all students can also be different. Therefore, coming to the classroom, the teacher may encounter students with a different level of preparation of their homework.

Tip: To be more prepared for this situation a teacher should set specific deadlines for studying the issued material. Besides, before the auditory lesson students may be asked to do some controlling task that measures the level of their knowledge.

6. The teacher who starts working with flipped classroom may face a lack of understanding from his colleagues. Not everyone is ready to accept the new, to change their approaches to learning. Criticism may intensify if new methods do not immediately provide a significant improvement in the educational process.

Tip: You should understand that something new will always be met with misunderstanding. Of course, a great help in solving such problems will be the creation of at least a small group of like-minded teachers. Moreover, they may not necessarily be colleagues from the same faculty or department. Although the work on one course of two or more teachers will help to assess the effectiveness of the chosen method more adequately. It should be remembered that the chosen teaching methodology can give good results in some student groups and not work in others.

So, to summarize the most important points:

1. Be confident of yourself when you start working with flipped classroom. It has been proved that at this stage it is a very effective learning technology.
2. Do not try to immediately renovate all your courses. Start with one course or a part of it.
3. Gather a team of like-minded people to discuss the organization of teaching and its results.

REFERENCES

1. Anderson, L. W., Krathwohl, D. R., Airasian, P. W., & Bloom, B. S. (2001). *A taxonomy for learning, teaching, and assessing : a revision of Bloom's taxonomy of educational objectives*. Longman.
2. Bergmann, J. (2012). *Flip Your Classroom: Reach Every Student in Every Class Every Day*. International Society for Technology in Education (ISTE). Kindle Edition.
3. Bonwell, C. C., Eison, J. A., Association for the Study of Higher Education., ERIC Clearinghouse on Higher Education, W. D., & George Washington Univ., W. D. S. of E. and H. D. (1991). *Active Learning: Creating Excitement in the Classroom*. 1991 ASHE-ERIC Higher Education Reports.
4. Cattaneo, K. H. (2017). Telling Active Learning Pedagogies Apart: From Theory to Practice. *Journal of New Approaches in Educational Research*, 6(2), 144–152.
5. Center for Teaching Innovation, Cornell University (n.d.) *Flipping the classroom*. <https://teaching.cornell.edu/teaching-resources/designing-your-course/flipping-classroom>.
6. Centre for Teaching Excellence, University of Waterloo (n.d.) Online Activities and Assessment for the Flipped classroom. <https://uwaterloo.ca/centre-for-teaching-excellence/teaching-resources/teaching-tips/lecturing-and-presenting/delivery/online-activities-and-assessment-flipped-classroom>.
7. Center for Teaching Excellence Office of the Faculty Success and Diversity, The university of Texas Rio Grande Valley (UTRGV) (n.d.) Learning Assessment Techniques. <https://www.utrgv.edu/cte/resources/learning-assessment-techniques/index.htm>.
8. Faculty Innovation Center, The University of Texas at Austin (2020) How do You Flip a Class? <https://facultyinnovate.utexas.edu/how-to-flip>.
9. Flipped Learning Network (FLN) (2014). What is Flipped Learning? https://flippedlearning.org/wp-content/uploads/2016/07/FLIP_handout_FNL_Web.pdf.
10. Koh, J. H. L. (2019). Four Pedagogical Dimensions for Understanding Flipped Classroom Practices in Higher Education: A Systematic Review. *Educational Sciences: Theory & Practice*, 19(4), 14–33. <https://doi.org/10.12738/estp.2019.4.002>.
11. Lage, M. J., Platt, G. J., & Treglia, M. (2000). Inverting the Classroom: A Gateway to Creating an Inclusive Learning Environment. *Journal of Economic Education*, (1), 30.
12. Laurillard, D. (2012). *Teaching as a Design Science: Building Pedagogical Patterns for Learning and Technology*. New York and London: Routledge.
13. Lo, C. K., & Hew, K. F. (2019). The impact of flipped classrooms on student achievement in engineering education: A meta-analysis of 10 years of research. *Journal of Engineering Education*, (4), 523.
14. Matsushita, K. (2018). *Deep Active Learning: Toward Greater Depth in University Education*. Springer Singapore.
15. O'Neal, C., Pinder-Grover, T. (n.d.). "How Can You Incorporate Active Learning Into Your Classroom?" in University of Michigan GSI Guidebook. University of Michigan, Center for Research on Learning and Teaching. http://www.crlt.umich.edu/sites/default/files/instructor_resources/how_can_you_incorporate_active_learning.pdf.
16. Roehling, P. V. (2018). *Flipping the college classroom: an evidence-based guide*. Palgrave Macmillan.
17. Talbert, R. (2015) Four Assessment Strategies for the Flipped Learning Environment. Faculty Focus - Higher Ed Teaching Strategies from Magna Publications. August 10, 2015. <https://www.facultyfocus.com/articles/blended-flipped-learning/four-assessment-strategies-for-the-flipped-learning-environment/>.
18. Talbert, R. (2014) The Inverted Calculus Course: Using Guided Practice to Build Self-Regulation. "Casting Out Nines" blog at Chronicle of Higher Education Blog Network. March 4, 2014. <https://www.chronicle.com/blognetwork/castingoutnines/2014/03/04/the-inverted-calculus-course-using-guided-practice-to-build-self-regulation/>.
19. TeachThought (2017). 28 Critical Thinking Question Stems For Any Content Area. <https://www.teachthought.com/critical-thinking/28-critical-thinking-question-stems-content-area/>.
20. Tofade, T., Elsner, J., Haines, S.T. (2013) Best Practice Strategies for Effective Use of Questions as a Teaching Tool. *American Journal of Pharmaceutical Education*, 77(7). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3776909/>.
21. Young, C., Perovic, N. (2018) Introduction to the ABC LD workshop. <https://blogs.ucl.ac.uk/abc-ld/>.

This Handbook is developed within the frame of Erasmus+ PRINTeL project aimed at promoting innovative teaching and learning pedagogies in Eastern Partnership Countries.

Innovative teaching is a proactive approach to integrate new teaching and learning (T&L) strategies and methods into a classroom. New technology plays a key role in innovative T&L to offer students a more interactive and attractive experience. Innovative T&L also involves creativity on the part of the teacher who reorganizes the educational process by transforming from “being a lecturer” to “being a designer” of learning methods and environments. Here the teacher serves as a guide or consultant while students participate. A primary motive of innovative T&L is to encourage the students’ broad engagement in the learning process. When students interact with teachers and peers, they gain more practical experience and retain more information from a class.

Visit www.printel.am for the PRINTeL project
Visit www.vatl.yzu.am for OERs in innovative T&L