

# BLENDED LEARNING

## KEYWORDS



Flipped classroom  
Problem-based learning  
Independent learning  
Online teaching  
Face-to-face teaching  
Active teaching  
Tutoring  
Team work



## DESCRIPTION



Blended learning is based on alternating independent, directed learning sessions (in which the student uses instructor-provided resources, typically online and which may include multimedia) with face-to-face sessions (e.g. lectures, tutorials, labs) which complement and/or progress the concepts explored during the independent study

## WHY IS IT INTERESTING ?



The benefit for students is in the opportunity to independently and actively tackle potentially complex topics, at a pace which suits them, freeing themselves from the constraints of place and time. Multimedia technologies can provide effective and varied learning/training resources, including quizzes, video capsules or illustrative examples

## HOW TO DO IT ?



1. Create the independent learning materials

2. Scripting the pedagogical process

3. Alternate sessions

Suitable for learners of level



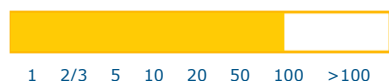
Investment time before session



Investment time post session



Suitable for managing large groups



Duration of the act



## FIRST STEPS



- Present the teaching methods, its relevance to the learning outcomes, the expectations and timelines
- Schedule free time (possibly by eliminating face-to-face sessions) to allow for independent learning
- Explore the concepts during tutorials
- Apply the concepts during a project, to facilitate students in consolidating their training

## OUR ADVICES



Estimate the time for independent learning time and ensure its integration into the teaching schedule  
Encourage students by assigning the independent study between each face-to-face session  
Apply the concepts learn in independent study during face-to-face sessions

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## EXAMPLES OF USEAGE

Complementary courses  
Video capsules completing certain parts of the course  
Illustrative exercises, with different levels of solutions

## EXAMPLE AT ENSIC

Level : **S6**  
Number of students involved : **100**  
Required resources : **Online course**

The pedagogy is applied to the design of heat exchangers

- A multimedia document makes it possible to understand the operation, to visualize the flows, and to explain the sizing the devices. It includes videos and exercises, with different levels of solutions
- The self-study sessions are supplemented by two tutorials, and the course is then applied to the sizing of different types of heat exchangers
- The problems deepen the concepts and places students in an active learning situation. Tutoring sessions help to guide the students in their realization. The final presentations allow students, who are all attending the defenses, to consider to the sizing of other devices

## REFERENCES

Development and Utilization of an E-learning Course on Heat Exchangers at ENSIC, Education for Chemical Engineers, 1, 2006, pp 82-89. E.Schaer, C.Roizard, N.Christmann & A.Lemaitre.  
<https://doi.org/10.1205/ece06001>

## MISTAKES TO AVOID ?

- Developing the self-study material can take a long time.
- Face-to-face and project sessions are to apply and consolidate the achievements of self-study. The teacher becomes a guide for knowledge & concepts applications

