Implementation of Flipped classroom in an intensive TRIZ* course

Systematic Creativity and Inventive Thinking

JURE Conference, Tampere
August 26-29, 2017

Iuliia Shnai
Lappeenranta University of Technology

Co-funded by the Erasmus+ Programme of the European Union
# Table of Contents

1. Introduction to Flipped classroom
2. Doctoral research and Current study
3. Theoretical background
4. Course redesign: Methods and Elements
5. Data gathering
6. Results and discussion
   6.1. Attitude
   6.2. Workload
7. Conclusions and recommendations
Flipped classroom
Doctoral study

Transition to flipped classroom within different initial conditions

Algorithm provided for implementers to make preliminary estimations of the resources and other conditions beforehand to improve and simplify the process of courses development

Aim of this paper is to study the flipped classroom implementation effect on intensive TRIZ course from perception and workload perspective from both students and teacher
Trends and theoretical background

- Student’s perception
- Workload
- Professor’s barriers
- Professor’s time-investments

Scopus Papers
2017 - 235
2016 - 460
2015 - 422
2014 - 185
2013 - 79
2012 - 14
Systematic creativity and Inventive problem solving (TRIZ)

- Summer school intensive course (since 2011) and winter school intensive course (since 2016) 78 hours = 3 credits
- Amount of participants : approx. 40
- Fields of study: Engineering and management
Course re-design and implementation

Systematic creativity- TRIZ basics (78 hour in total)

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>In</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Traditional course</strong></td>
<td><strong>24 hours</strong></td>
<td><strong>20 hours</strong></td>
<td><strong>26 hours</strong></td>
</tr>
<tr>
<td>Summer and winter school 2015</td>
<td><strong>Lectures with exercises</strong></td>
<td><strong>Team and project work</strong></td>
<td><strong>Independent work</strong></td>
</tr>
<tr>
<td><strong>Partly flipped course</strong></td>
<td><strong>3-4 hours</strong></td>
<td><strong>20 hours</strong></td>
<td><strong>8 hours</strong></td>
</tr>
<tr>
<td>Summer school 2016</td>
<td><strong>Video preparation</strong></td>
<td><strong>Project work (in groups)</strong></td>
<td><strong>26 hours</strong></td>
</tr>
<tr>
<td><strong>Partly flipped course</strong></td>
<td><strong>6-7 hours</strong></td>
<td><strong>20 hours</strong></td>
<td><strong>26 hours</strong></td>
</tr>
<tr>
<td>Winter school 2016</td>
<td><strong>E-learning platform preparation</strong></td>
<td><strong>Lectures with exercises</strong></td>
<td><strong>Project presentations</strong></td>
</tr>
</tbody>
</table>
Blended elements

Videos

- Video on camera
- Text-overlay video

Activation feedback system

E-learning open platform

Link to videos

Link to platform
Data Gathering

- **Students' Surveys**
- **Professor's Interview**
- **Personal Observations**
- **Platform Statistics**

**Pilot 1. Summer school TRIZ course 2016**

**Pilot 2. Winter school TRIZ course 2017**
Results: Video configuration and Frequency of the video use

1.1. In the first week of the summer school, I sent you 5 videos. How many videos were you able to watch?

- 0 videos: 0 (0%)
- 1 video: 0 (0%)
- 2 videos: 0 (0%)
- 3 videos: 5 (38.5%)
- 4 videos: 2 (15.4%)
- 5 videos: 6 (46.2%)

2. Did you watch them fully?

- I didn’t watch them: 30.6%
- Not at all: 36.5%
- Some of them: 7.7%
- Most of them: 23.1%
- All of them: 0%
Results: General students perception

1. Videos increase learning (Deepening into material)  
13 responses

2. Videos increase understanding of the topic of the course  
13 responses

3. Videos allow to prepare more questions and comments beforehand for the class  
13 responses

4. Preparation videos increase my interest and involvement in the future class (topic)  
13 responses
Results: Professor’s perception

The prime challenges for professor distinguished in the paper include

- correct instructional design (design)
- effective bridging online and offline content (design)
- development of the online materials (resources, skills)
- appropriate time distribution (resource)
Results

Workload
“It was too much information for one course”.

“The preparation materials on the separate online platform looks like separate online course”

Videos
“Actually I did not get the full idea what was explained in the videos, just partial understanding was in my mind. When I came to the lectures I had already idea and really easily fill all spaces by details and, finally, obtained the full picture of material”

“Most useful application of these videos - comparing your own vision of a problem with professor`s recommendations and advices”

“It would be better to show the text as a whole and not type it because then you can concentrate on what is said instead of following the written text. Now I sometimes missed some sentences of the oral explanations because I was paying attention to the writing.”
Conclusion

- Positive perception from both students and professor
- Course transition to blended form can be also disappointing and full of defects
- Workload can impact negatively on attitude and participation
- Increased time requirements can be eliminated with the assistance
Guidelines, Discussions and Improvements

1. Do not increase the course time within the intensive course
2. Decrease the class time, when you add the preparation materials
3. Share the preparation course materials in advance
4. Add motivation (like quizzes) to increase the video views
5. Do not make quizzes too complicated
6. Make the preparation materials «not optional» but required
7. Keep the video duration as 10 minutes approximately
8. Build the bridge between online and offline materials
9. Video density is higher than normal lecture (10 minutes video can require 25 minutes to understand it)
# Course re-design

<table>
<thead>
<tr>
<th>Lectures with exercises</th>
<th>Team and project work</th>
<th>Project presentations</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 hours</td>
<td>20 hours</td>
<td>8 hours</td>
<td>26 hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Video/ E-learning platform</th>
<th>Lectures with exercises</th>
<th>Project work (in groups)</th>
<th>Project presentations</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-7 hours</td>
<td>20 hours</td>
<td>20 hours</td>
<td>8 hours</td>
<td>26 hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Video +Quiz</th>
<th>Discuss</th>
<th>Lecture with exercise</th>
<th>Activities (quiz, games, role changes)</th>
<th>Project work in teams</th>
<th>Independent work</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 hours</td>
<td>3 hours</td>
<td>10 hours</td>
<td>20 hours</td>
<td>15 hours</td>
<td>26 hours</td>
</tr>
</tbody>
</table>
M.Sc. Iuliia Shnai
Department of Industrial Engineering and Management
School of Business and Management
Lappeenranta
University of Technology, Finland

Thank you

Open your mind. LUT.
Lappeenranta University of Technology