Learning Experience from Teaching and Learning Methods in Engineering Education: Instructors’ Viewpoint

Duangthida Hussadintorn Na Ayutthaya,
Pisut Koomsap,
Rui M. Lima,
Tomasz Nitkiewicz

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Outline

1. MSIE 4.0 Project
2. Learning Experience
3. The Progression of Teaching & Learning Methods (T&Ls)
4. T&Ls on LOVE Grid
5. Research Methodology & Survey Participants
6. Results and Discussions
Analysis of MSIE Curricula

Gap Analysis

A Modernized MSIE Curriculum

Syllabuses for All Courses

Teaching & Learning Materials

Pilot Teaching

Platform for Online Learning

Laboratory with Online Remote Access

Short-Term Courses for Professionals

Submission of the curriculum for Accreditation

Organizing A Conference on Engineering Education

KEY OUTPUTS
Learning Process

- Course
  - Functional Component
    - Course content
  - Humanic Component
    - Instructor
  - Mechanic Component
    - Teaching and Learning Methods
    - Learning Environment

Knowledge Skills Competence

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Conventional way of learning

- Focus on knowledge
- Center on teacher
- Lecture Intensive

Students
How do you feel?
Conventional way of learning

• Focus on knowledge
• Center on teacher
• Lecture Intensive
Progress of teaching and learning methods in the view of learning experience

Nature of Learning
- Authentic/Real-World
- Visual
- Virtual

Absorption
- Passive
- Active

Immersion
- Demand at the Workplace

Student Involvement
- Professional Development

Traditional Teaching and Learning Methods

PrBL
- Visual Lab
- Virtual Lab

PjBL
- Flipped Classroom
- Interactive Online Learning

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## Existing Teaching & Learning Methods

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<td>12. Individual presentation</td>
<td>22. Seminars conducted in class</td>
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<td>3. Case study</td>
<td>13. Integrated or interdisciplinary teaching</td>
<td>23. Showing video material</td>
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<td>7. Discussion</td>
<td>17. Online interactive learning</td>
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<td>8. Field classes, trips and excursion</td>
<td>18. Problem-based learning (PrBL)</td>
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<td>9. Game-based learning</td>
<td>19. Programmed teaching</td>
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<td>10. Guided conversation</td>
<td>20. Project-based learning (PjBL)</td>
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### Teaching & Learning Methods on LOVE Grid

**V-Visiting**  
(passive immersion)  
1. Field classes, trips and excursions  
2. Conference  
3. Virtual reality  

**O-Observing**  
(passive absorption)  
1. Lecture  
2. Guided conversation  
3. Integrated or interdisciplinary teaching  
4. Showing video material  
5. Seminars conducted in classes  
6. Live lecture from a remote place  

**E-Experimenting**  
(active immersion)  
1. Project-based learning (PjBL)  
2. Laboratory classes  
3. Virtual laboratory  

**L-Learning**  
(active absorption)  
1. Discussion  
2. Demonstration with exercising  
3. Class debate  
4. Small groups debate  
5. Simulation  
6. Problem-based learning (PrBL)  
7. Programmed teaching  
8. Workshop  
9. Brainstorming  
10. Case study  
11. Online interactive learning  
12. Game-based learning  
13. Guided practical exercises  
14. Role play  
15. Assignments  
16. Individual presentation  

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Research Methodology & Survey Participants

**Research Methodology**

**Questionnaire Set Up**

1) The most **applied** teaching and learning methods

2) The most **efficient** teaching and learning methods

**Data Analysis**

- **Weighted average** and **standard deviation** were used to represent the most applied teaching and learning methods.
- **A five Likert scale** was applied in descending order for weights of the importance of the top five ranking and the sum of products was used for ranking the efficient methods.

**Survey Participants**

- **42 Instructors** from the project consortium (3 EU universities, 6 Thai universities)
- 73.8% have been teaching ≥ 5 years, and 50% have been teaching ≥ 10 years.
- They have offered 4 courses on average.

Choice:
- (0) have never been applied,
- (1) applied in a very few of the courses,
- (2) applied in some of the courses,
- (3) applied in half of the courses,
- (4) applied in many of the courses,
- (5) applied in all of the courses
Results

The comparison between the most applied and the most efficient teaching and learning methods (TLs) in engineering education from instructors’ viewpoint

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Discussions

• There exists strong conformity of application level and efficiency rank.

• **Decreasing potential methods** – observer experience methods

• **Growing potential methods** – experimenter experience methods that are expected to have higher coverage but certainly need strategic, program-oriented development path,

• **Redefining potential methods** – learner experience methods that have outdated approaches and structure and visitor experience methods that have only supportive role in education
Conclusions

• The strong interrelation can be observed between the assessment level of teaching and learning methods and their actual use.
• From their opinion, majority of conventional teaching and learning methods are still efficient.
• The instructors still prefer to transfer knowledge to students and to encourage them participate in the transferring process.
• The approach can also be applied in other disciplines for their instructors to understand and properly make an adjustment to make student learning experience richer.
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Thank You
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