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Learning Experience in Engineering Education: Present and Future

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Curriculum Development
of Master's Degree Program in
Industrial Engineering for Thailand Sustainable Smart Industry

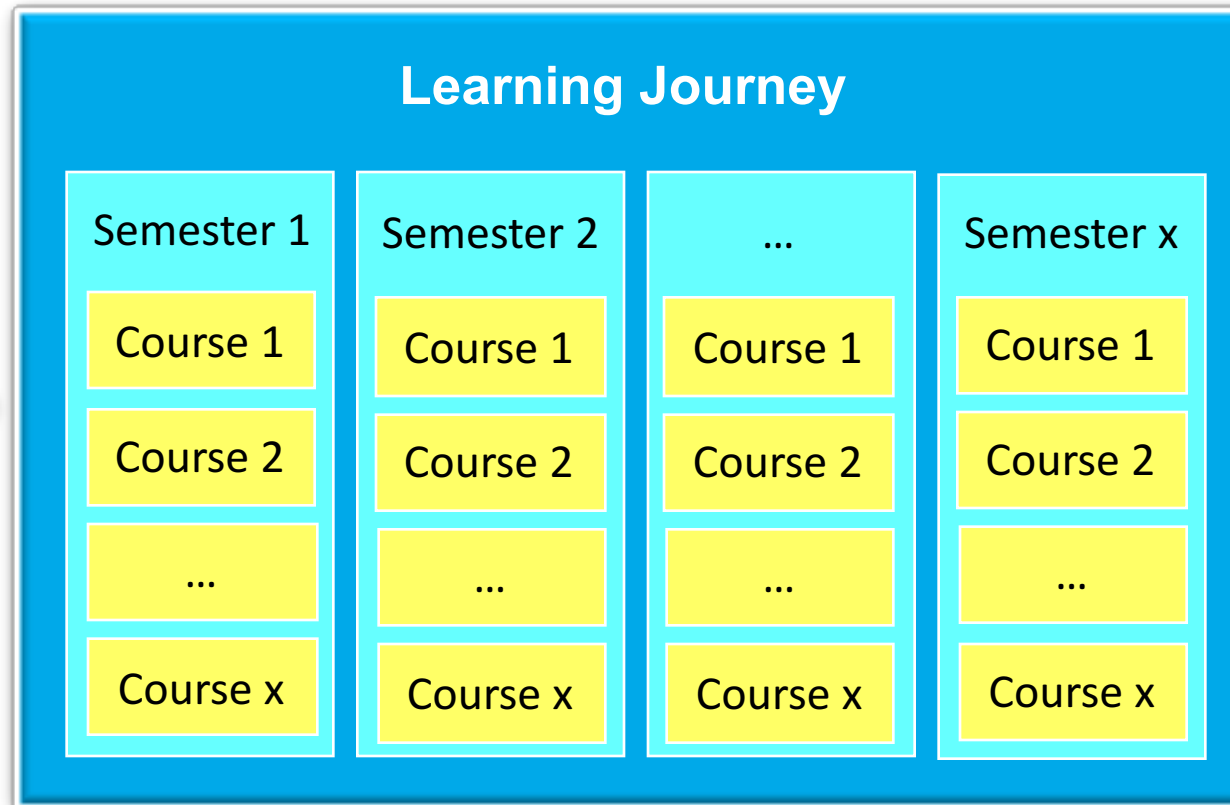
Learning is not an outcome. It's a process.

It does not create knowledge, skills or competence.

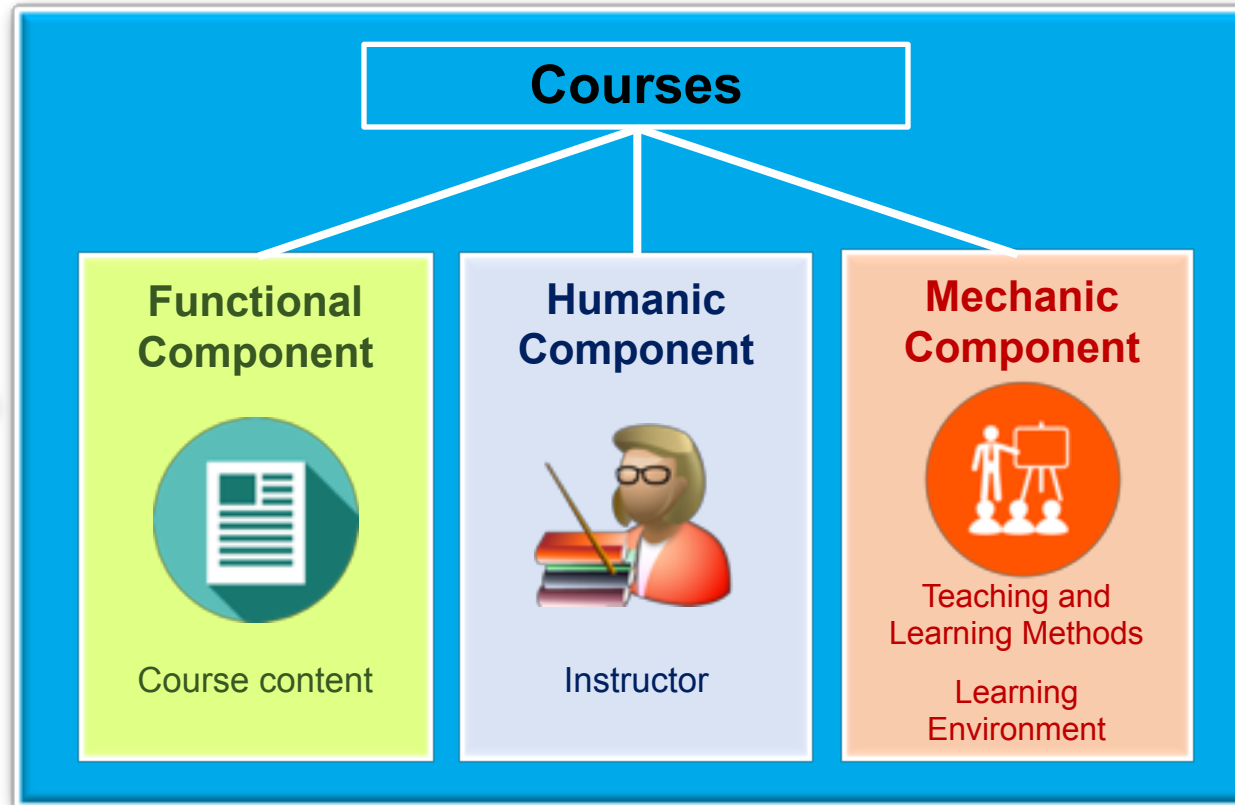
It creates experience.

**Learning process produces experience
that builds knowledge and skills.**

**Good learning process produces a strong experience
that builds competence.**



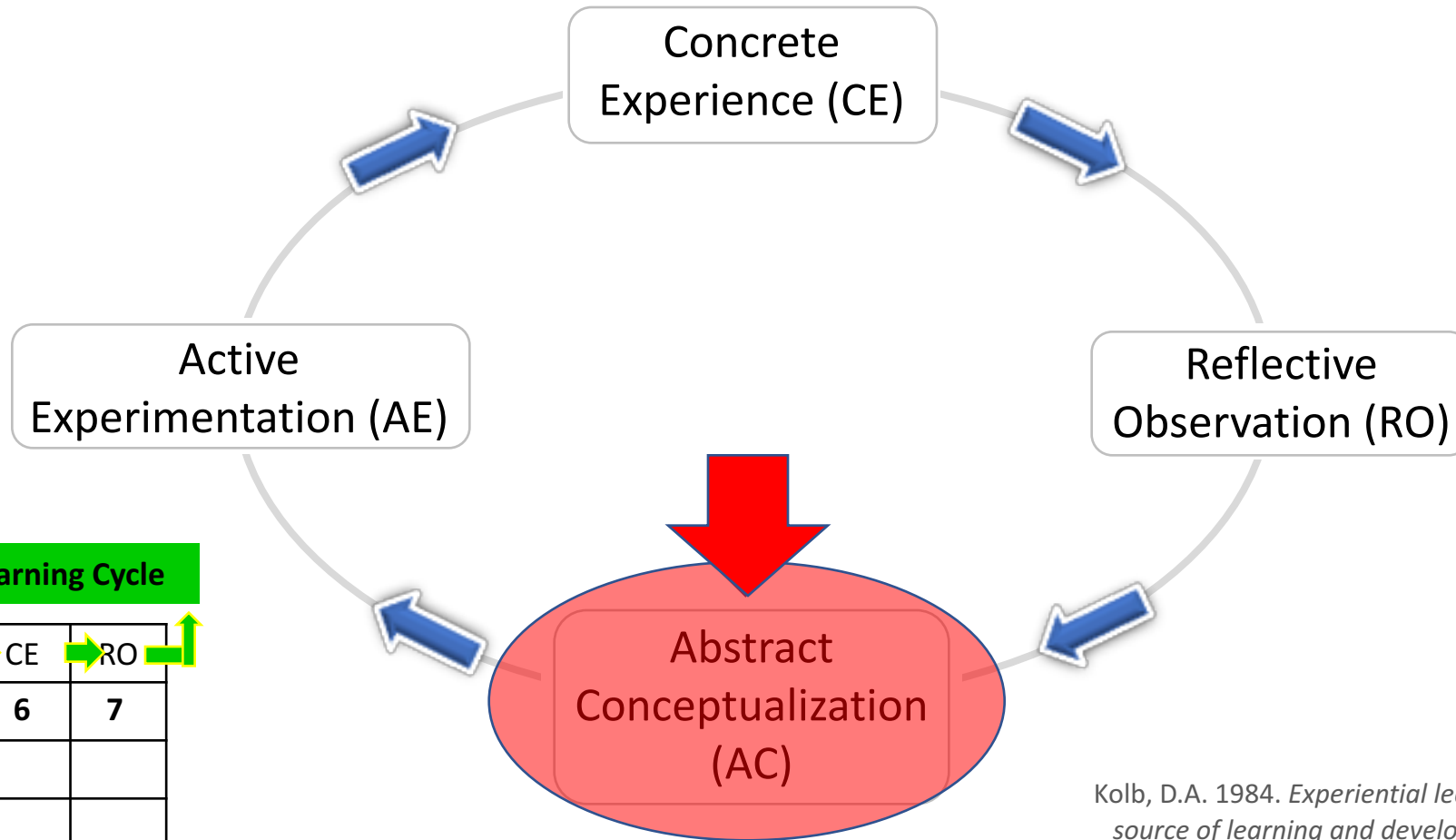
**Knowledge
Skills
Competence**



Conventional way of learning



Kolb's Model: Experiential Learning Cycle



Experiential Learning Cycle



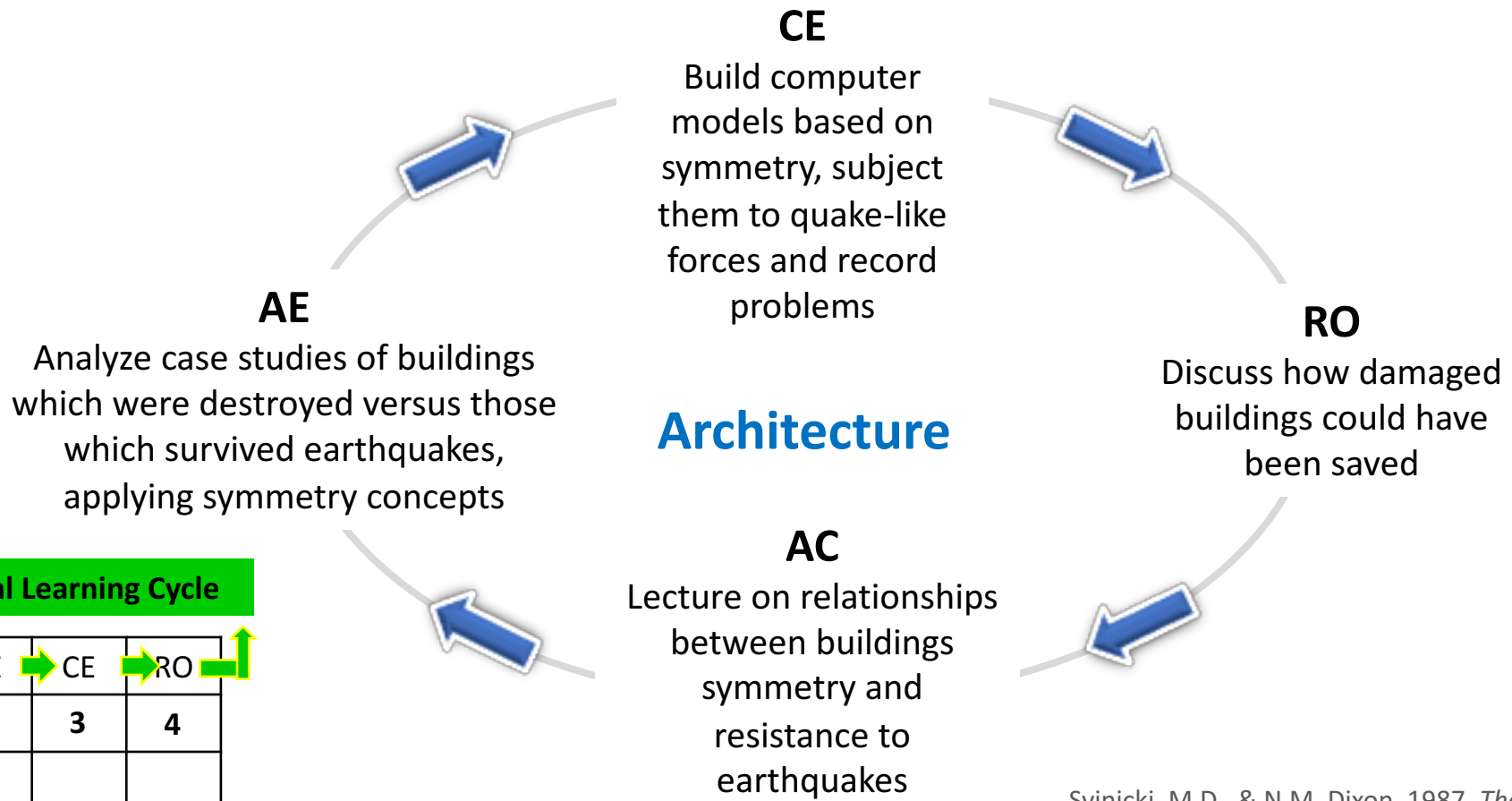
| | AC | AE | CE | RO |
|----|----|-----|----|----|
| T1 | 1 | 5 | 6 | 7 |
| T2 | 2 | | | |
| T3 | 3 | | | |
| T4 | 4 | | | |
| Tx | | ... | | |

Content

Kolb, D.A. 1984. *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, New Jersey: Prentice-Hall.

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Svinicki, M.D., & N.M. Dixon. 1987. *The Kolb model modified for classroom activities*. College Teaching, vol. 35, no. 4, pp. 141-146.

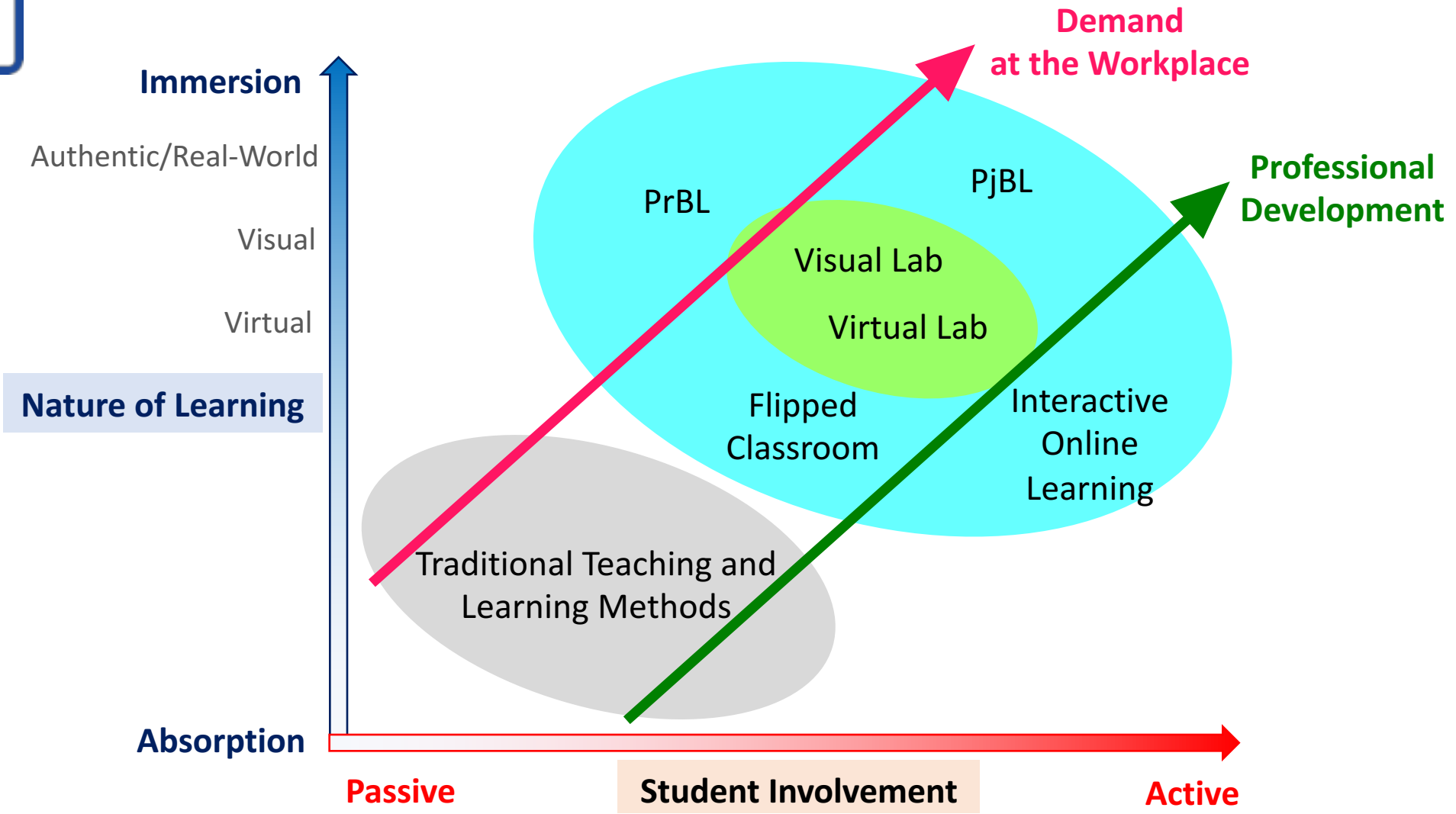


Experiential Learning Cycle



| | | | | |
|----|----|-----|----|----|
| | AC | AE | CE | RO |
| T1 | 1 | 2 | 3 | 4 |
| T2 | | | | |
| T3 | | | | |
| T4 | | | | |
| Tx | | ... | | |

Progress of teaching and learning methods in the view of learning experience







| | | | |
|--------------------------------------|---------------------------------------|--|---------------------------------|
| Teaching and Learning Methods | 1. Assignments | 11. Guided practical exercises | 21. Role play |
| | 2. Brainstorming | 12. Individual presentation | 22. Seminars conducted in class |
| | 3. Case study | 13. Integrated or interdisciplinary teaching | 23. Showing video material |
| | 4. Class debate | 14. Laboratory classes | 24. Simulation |
| | 5. Conference | 15. Lecture | 25. Small group debate |
| | 6. Demonstration with exercising | 16. Live lecture from a remote place | 26. Virtual laboratory |
| | 7. Discussion | 17. Online interactive learning | 27. Virtual reality |
| | 8. Field classes, trips and excursion | 18. Problem-based learning (PrBL) | 28. Workshop |
| | 9. Game-based learning | 19. Programmed teaching | |
| | 10. Guided conversation | 20. Project-based learning (PjBL) | |

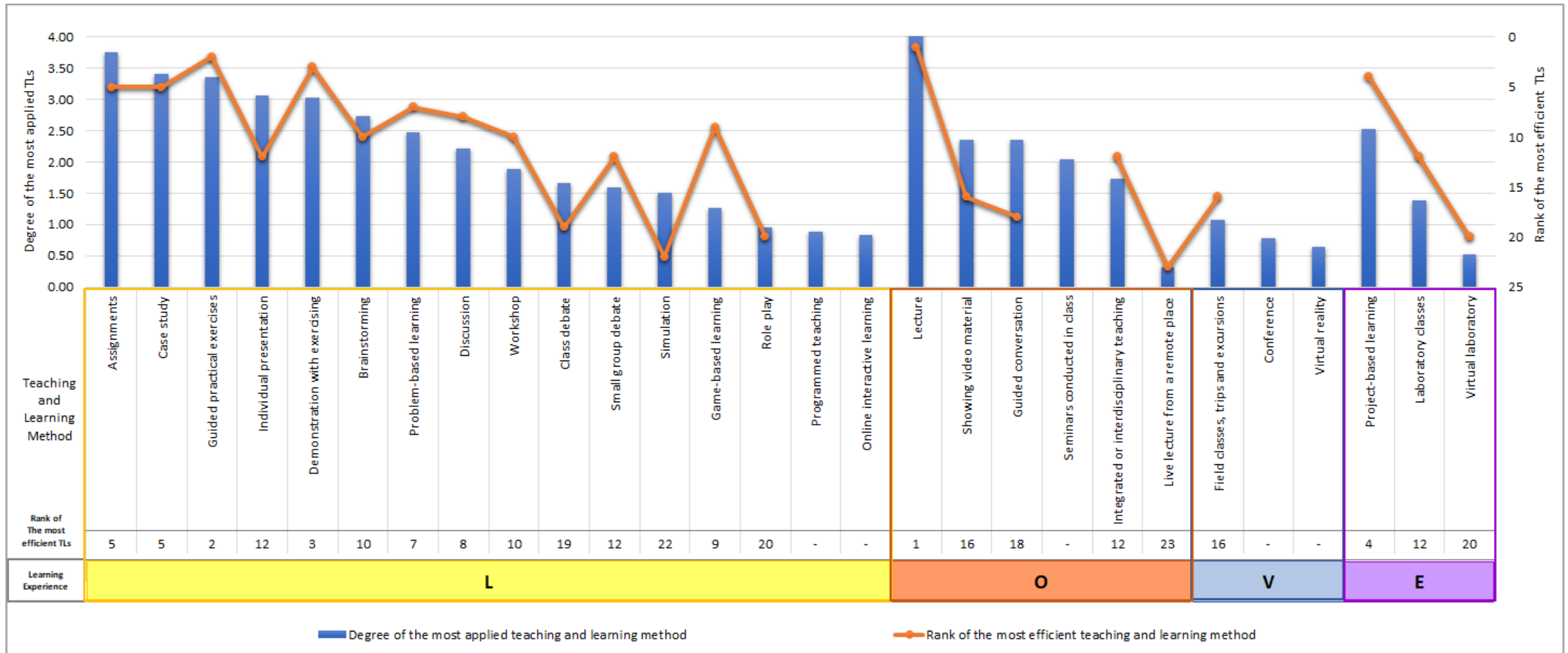
Sajjad, S. (2010). Effective teaching methods at higher education level. *Pakistan Journal of Special Education*, 11, 29-43.

Močinić, S. N. (2012). Active teaching strategies in higher education. *Metodički obzori: časopis za odgojno-obrazovnu teoriju i praksu*, 7(15), 97-105.

Classification Results

| | | | |
|--|---|--|---|
|  <p>V-Visiting (passive immersion)</p> |  <p>E-Experimenting (active immersion)</p> | | |
| <ol style="list-style-type: none"> 1. Field classes, trips and excursions 2. Conference 3. Virtual reality | <ol style="list-style-type: none"> 1. Project-based learning (PjBL) 2. Laboratory classes 3. Virtual laboratory | | |
|  <p>O-Observing (passive absorption)</p> |  <p>L-Learning (active absorption)</p> | | |
| <ol style="list-style-type: none"> 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 | <table border="0"> <tr> <td style="vertical-align: top;"> <ol style="list-style-type: none"> 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 </td> <td style="vertical-align: top;"> <ol style="list-style-type: none"> 13. Guided practical exercises 13. Role play 14. Assignments 15. Individual presentation </td> </tr> </table> | <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 13. Guided practical exercises 13. Role play 14. Assignments 15. Individual presentation |
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The comparison between the most applied and the most effective teaching and learning methods (TLs) in engineering education from instructors' viewpoint



Experiential Learning Cycle



AC → AE → CE → RO

| | | | | | |
|---------|----|--|--|--|--|
| Content | T1 | | | | |
| | T2 | | | | |
| | T3 | | | | |
| | T4 | | | | |
| | Tx | | | | |

LOVE-Based Teaching & Learning Methods



AC AE CE RO

| | | | | | |
|---------|----|--|--|--|--|
| Content | T1 | | | | |
| | T2 | | | | |
| | T3 | | | | |
| | T4 | | | | |
| | Tx | | | | |

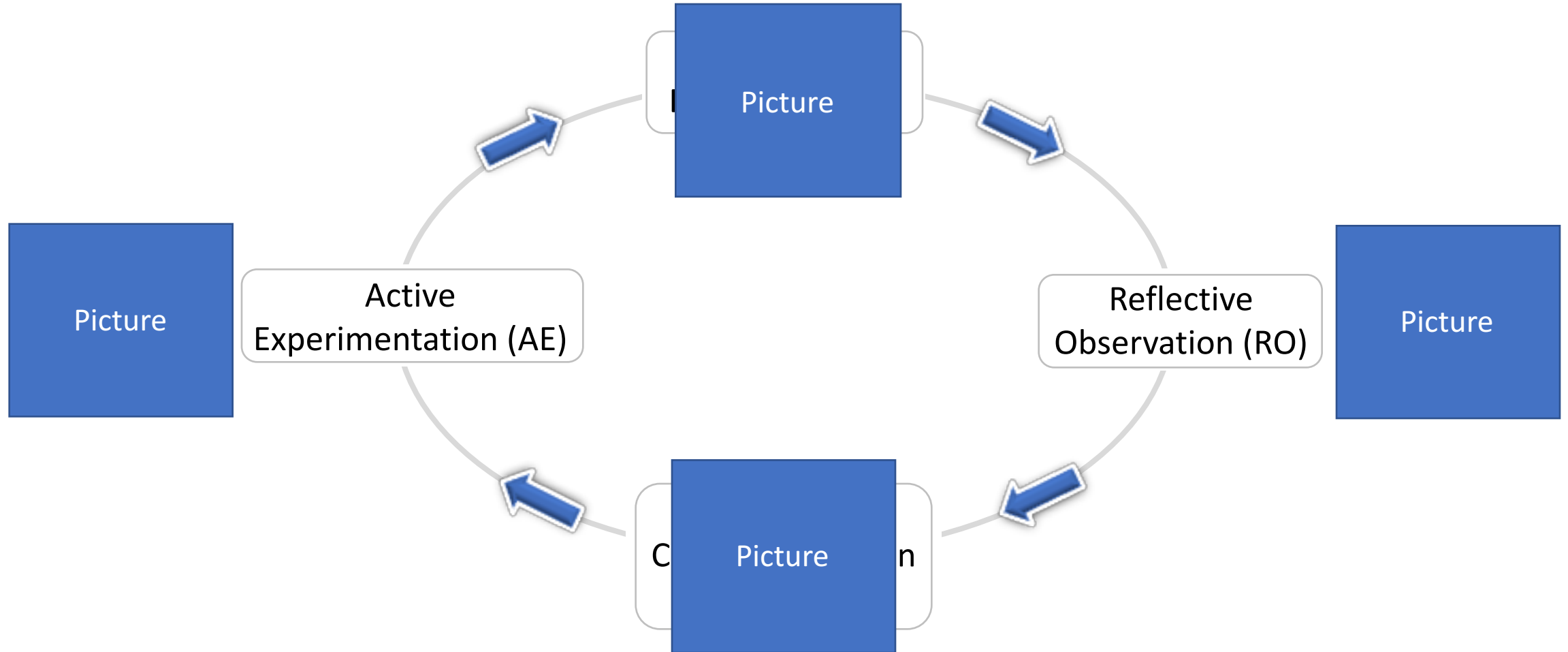
Experiential Learning Cycle

| | | AC | AE | CE | RO |
|---------|----|-----|----|----|----|
| Content | T1 | 1 | 2 | 3 | 4 |
| | T2 | 5 | 6 | 7 | 8 |
| | T3 | 9 | 10 | 11 | 12 |
| | T4 | 13 | 14 | 15 | 16 |
| | Tx | ... | | | |

LOVE-Based Teaching & Learning Methods

| | | AC | AE | CE | RO |
|---------|----|---------|---------|---------|---------|
| Content | T1 | TLx [O] | TLx [L] | TLx [L] | TLx [L] |
| | T2 | TLx [L] | TLx [L] | TLx [L] | TLx [L] |
| | T3 | TLx [O] | TLx [E] | TLx [V] | TLx [L] |
| | T4 | TLx [O] | TLx [E] | TLx [E] | TLx [L] |
| | Tx | ... | | | |

Experiential Learning Cycle: *Example*





My Motivation for MSIE 4.0



Erasmus Plus program gives us an opportunity to move away from developing another continuously improved curriculum.

We would like to have a **disruptive curriculum** that will be used **for 30 years**. 😊

We will replace instructors with coaches.

We will replace teaching with training.

We will replace knowledge with competences.

We would like to create assets to society.

There are many footsteps ahead, but **we want to make our own**.

You may say I'm a dreamer, but I'm not the only one.

I hope one day you will join us. Our education will be a great one.





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Thank You



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