Engineering Laboratories Pre/Post-lab Material Development

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Outline

- Introduction
- Kolb's Experiential Learning Theory
- Current Engineering Laboratory Arrangements
- Pre and Post-lab Material Development
- Observations and Conclusions

Introduction

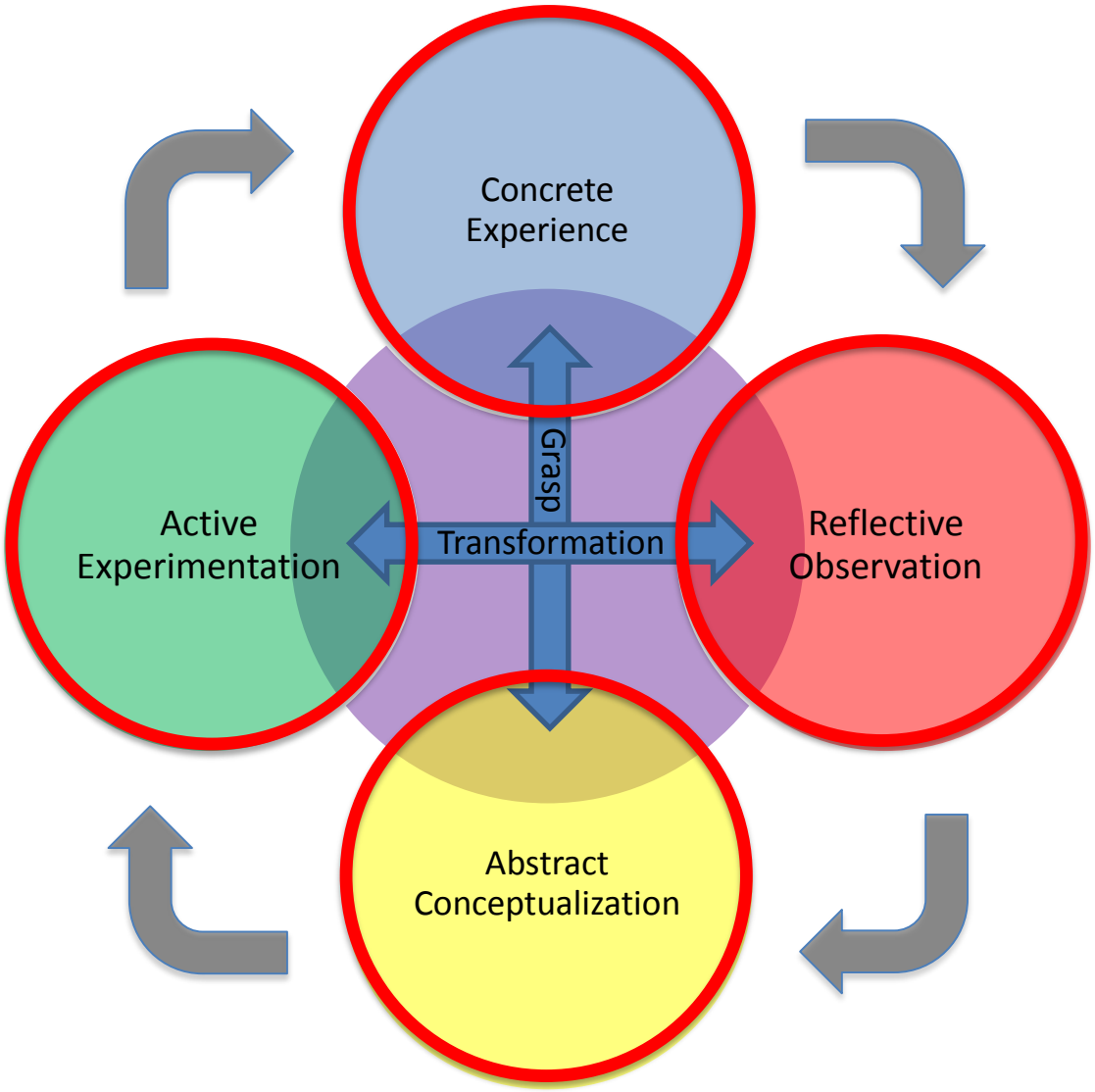
- Engineering had been taught as hands-on experience primarily.
- It has then changed to more classroom based education.
- Laboratory experience in engineering subjects has a significant role in the overall learning outcome of the subject.
- Engineering industry is demanding graduates with acceptable hands-on experience.

Introduction

- In most of the engineering subjects a satisfying outcome is **not achieved** from the engineering **laboratories**.

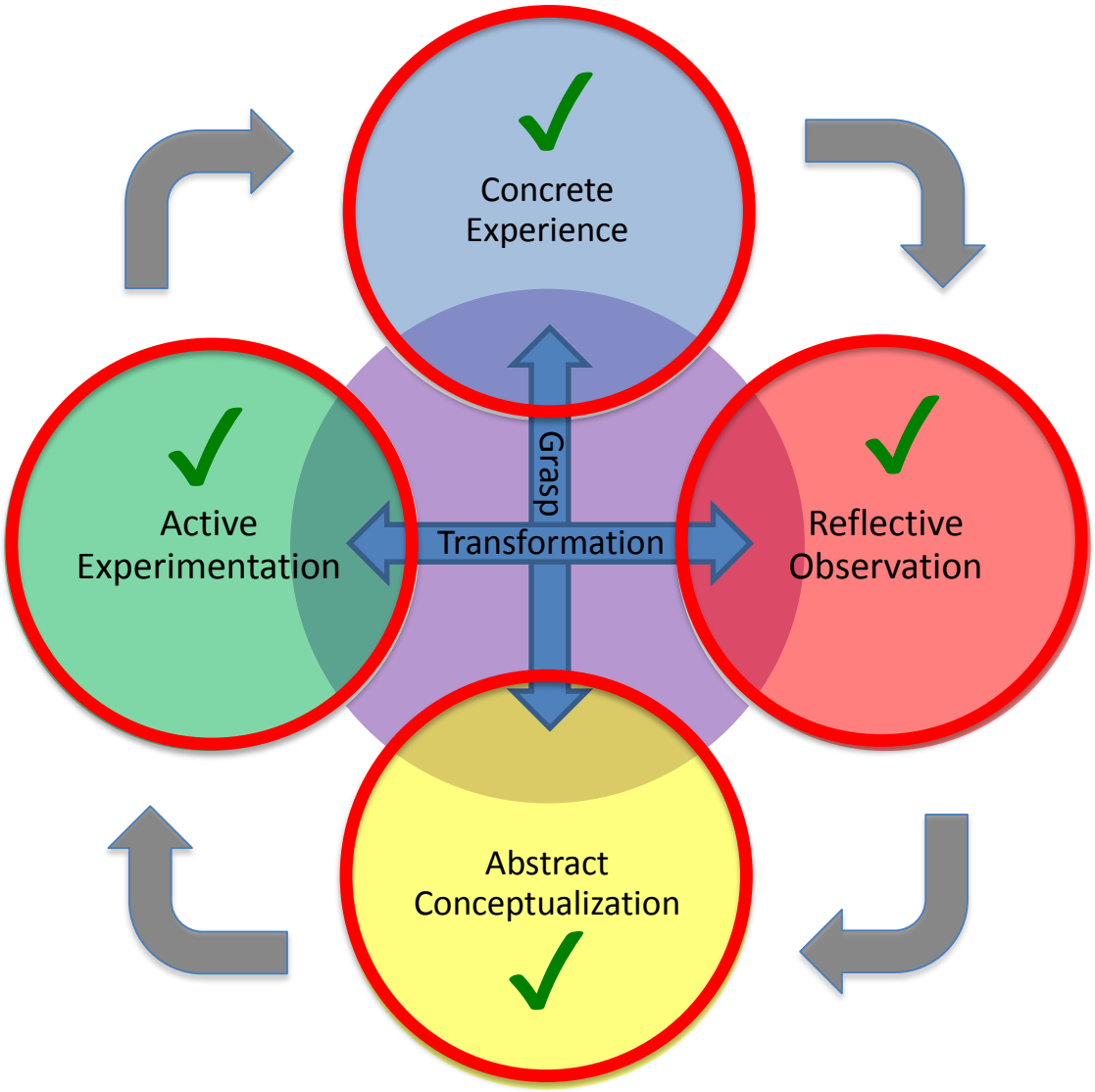
WHY?

Kolb's Experiential Learning Theory



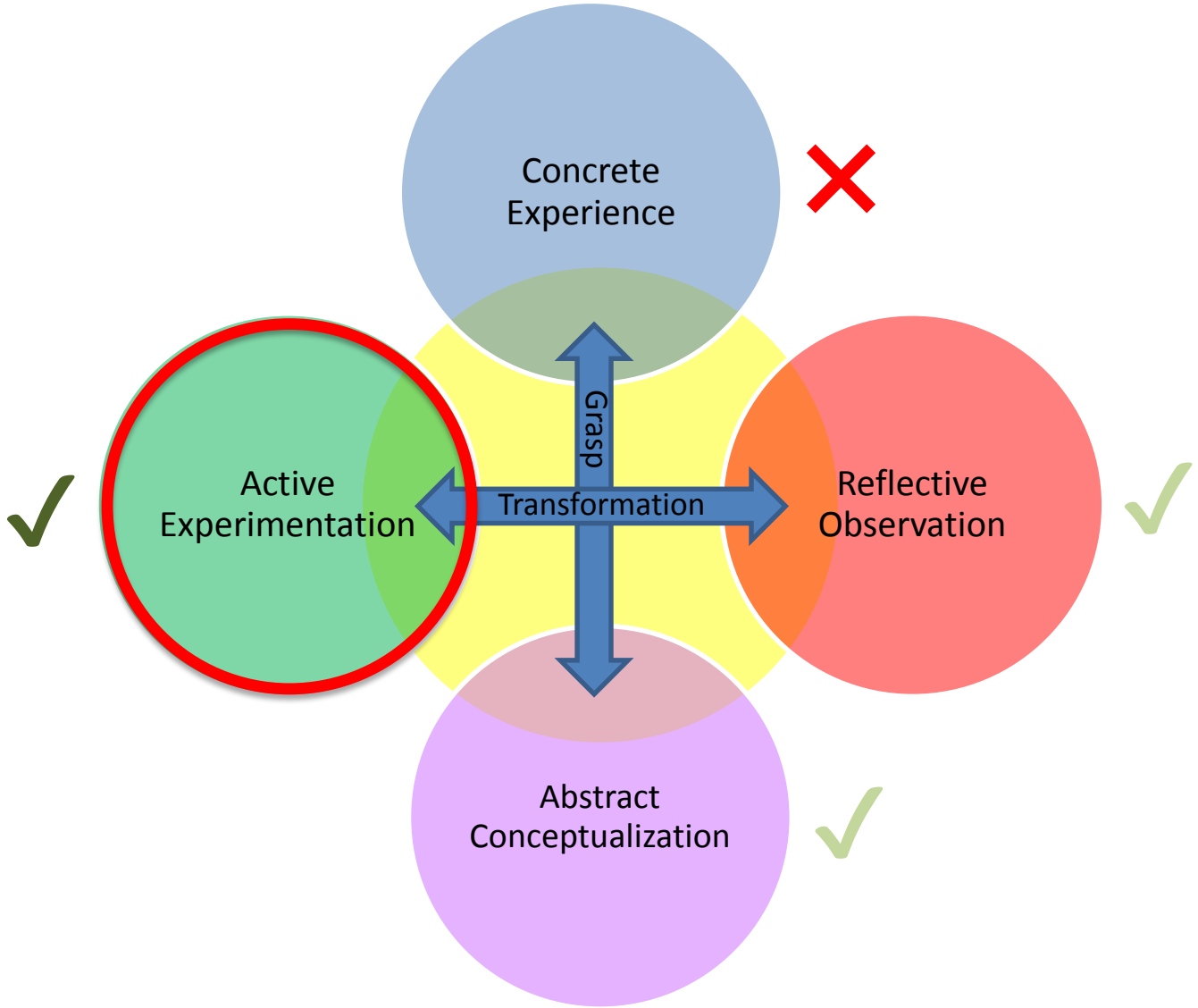
From: Kolb's Theory, 1984

Kolb's Experiential Learning Theory



Current Engineering Laboratory Arrangement

Pre-lab material → **Hands-on lab experience** → Post-lab assessment



Current Engineering Laboratory Arrangement

Consequences

- Lab session used for grasping the knowledge
- Inefficient use of students time and university resources
- **Poor learning outcome**

Development of Pre and Post Laboratory Material

(For Engineering subjects with 250+ students)

Pre-lab material:

- **Videos** of the experiment procedure
  - Preparation
  - Procedure
  - **OH&S** considerations
- Introduction on the **theory** behind the experiment
- **Tests** (85% of marks obtained)
- **Predicting** the upcoming experiment results

Development of Pre and Post Laboratory Material

(For Engineering subjects with 250+ students)

Post-lab material:

- **Assignments**
  - Comparing test results with the predicted results
  - Reflecting on their predicted results

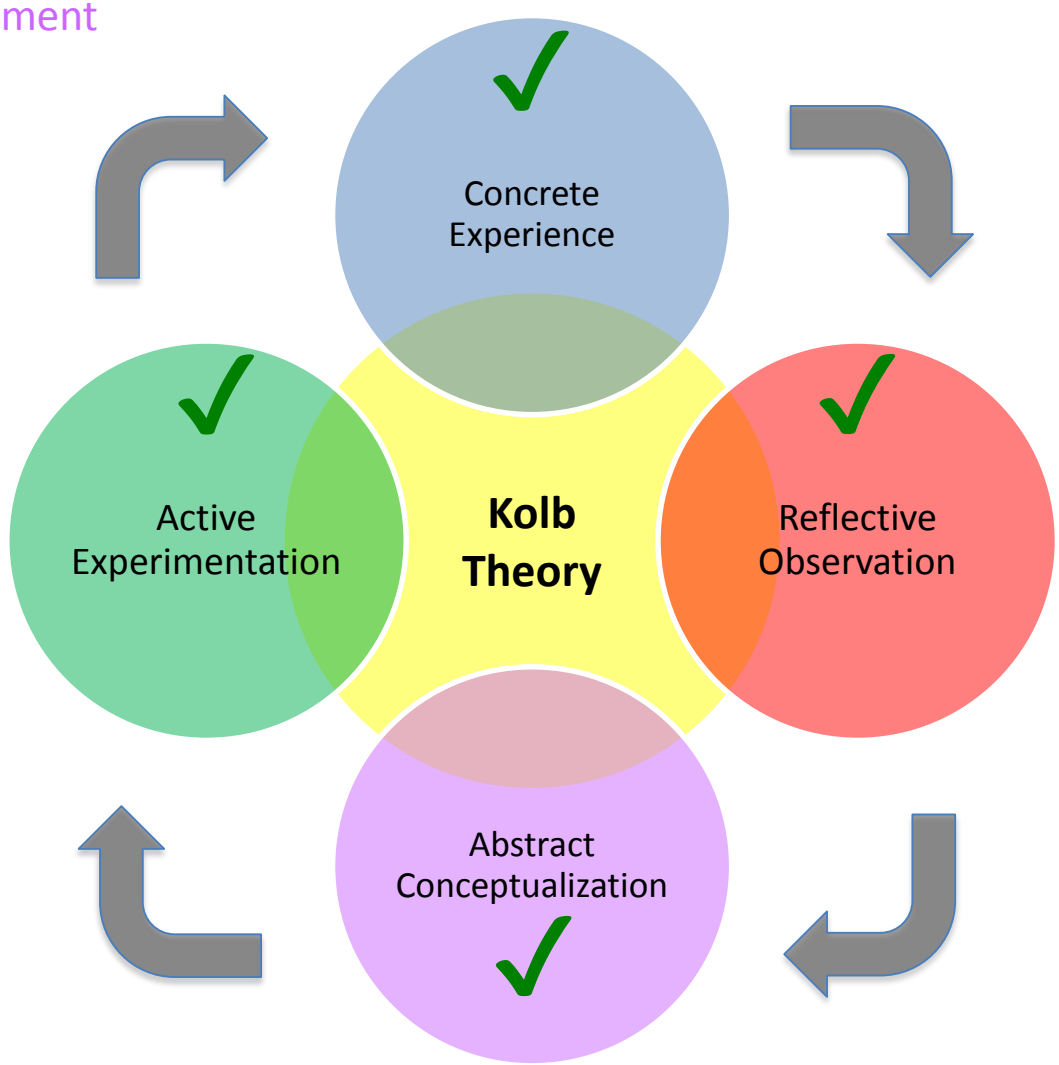
Development of Pre and Post Lab Material

Pre-lab material → Lab experiment → Post-lab assessment

- Video
- Theory of experiment
- Quiz

- Hands-on experiment

- Assignments



Observations and Conclusions

- Students enjoyed the fully hands-on experiment,
- Better conceptual understanding of the problem was achieved,
  - In the final exam question relevant to the experiment
  - In the assignment on the experience results
- Pre-lab material has been viewed close to the hands-on session as well as before the exam,

Observations and Conclusions

- Relatively positive feedback received from the students (from SES-2016),
- Demonstrators spent significantly less time on explaining the theory,
- Students claimed they can better link between the theory and practice (SES 2016).

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THANK YOU