Reflective Learning in a Large Core Course in Mechanical Engineering

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Introduction (Context)

1. **The Course**: *Intensely practical and analytical*. Requires activation of prior knowledge structure. Offered to students from multiple disciplines.

2. **Core**: Essential in the training of a mechanical engineer in years 3/4. Student motivation?

3. **Large**: Class size >70

4. **Mixed**: A combination of 3rd and 4th year; Students from different disciplines: Mech and Eng.Phys

5. Format: Lectures (3 hours per week); Tutorial (1 hour); Laboratory (~12 hours per week)

Goal: Promote life-long learning (CEAB graduate attributes)

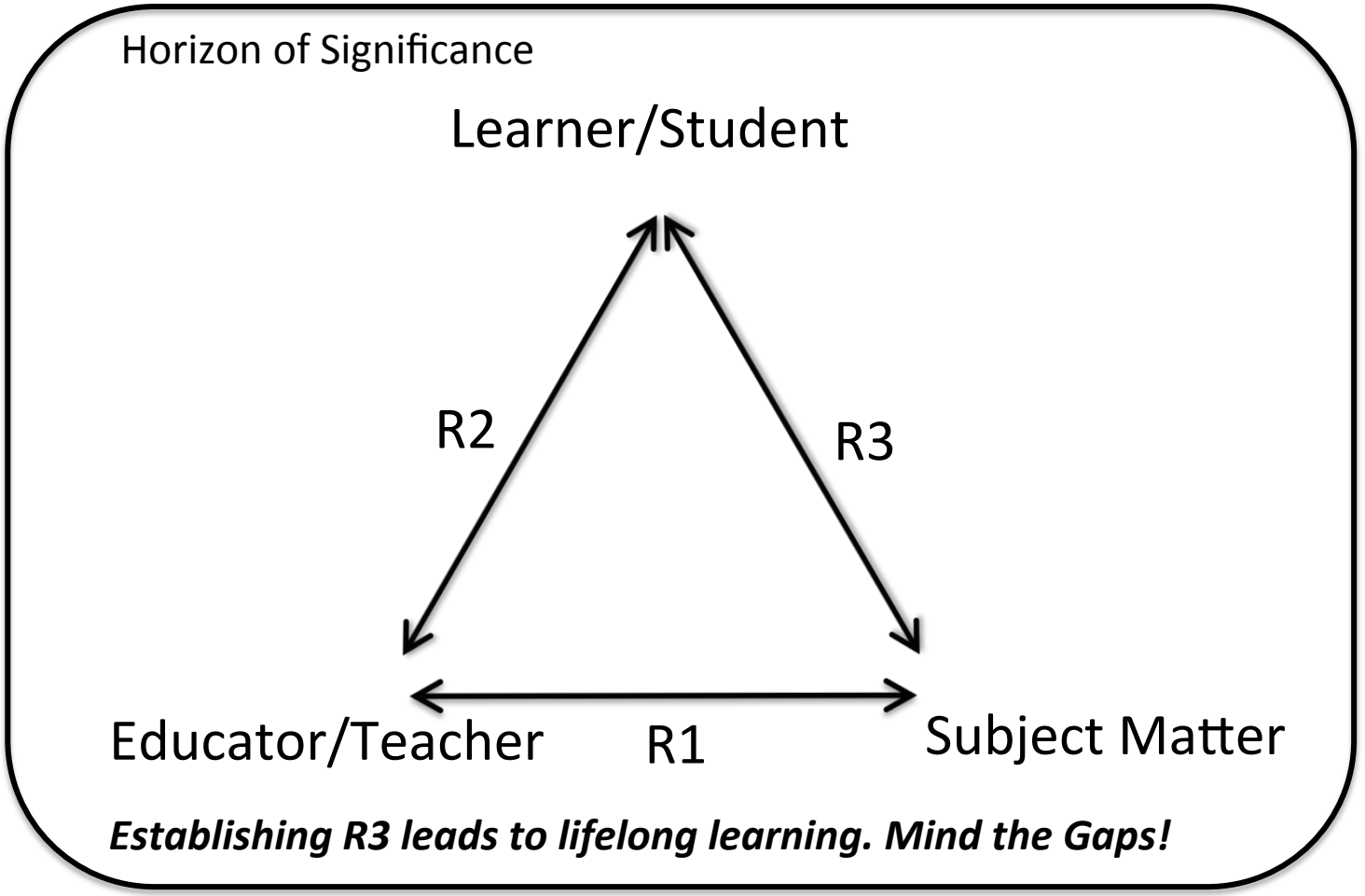
SEoT: Lot of insights and opens doors of inquiry for another story on teaching….

Motivation: Classroom Practice

"On another note, I am sure you know that this is **the second (albeit last) time I am taking this course with you**. I just wanted to mention that I am really enjoying the course and your teaching style this time around. **My attitude has had a big affect in this area** but I've noticed slight changes in the way the material is presented. So I would just like to compliment you on your current teaching style/methods, they are personally very effective."

A quote from a student who has repeated this course twice.

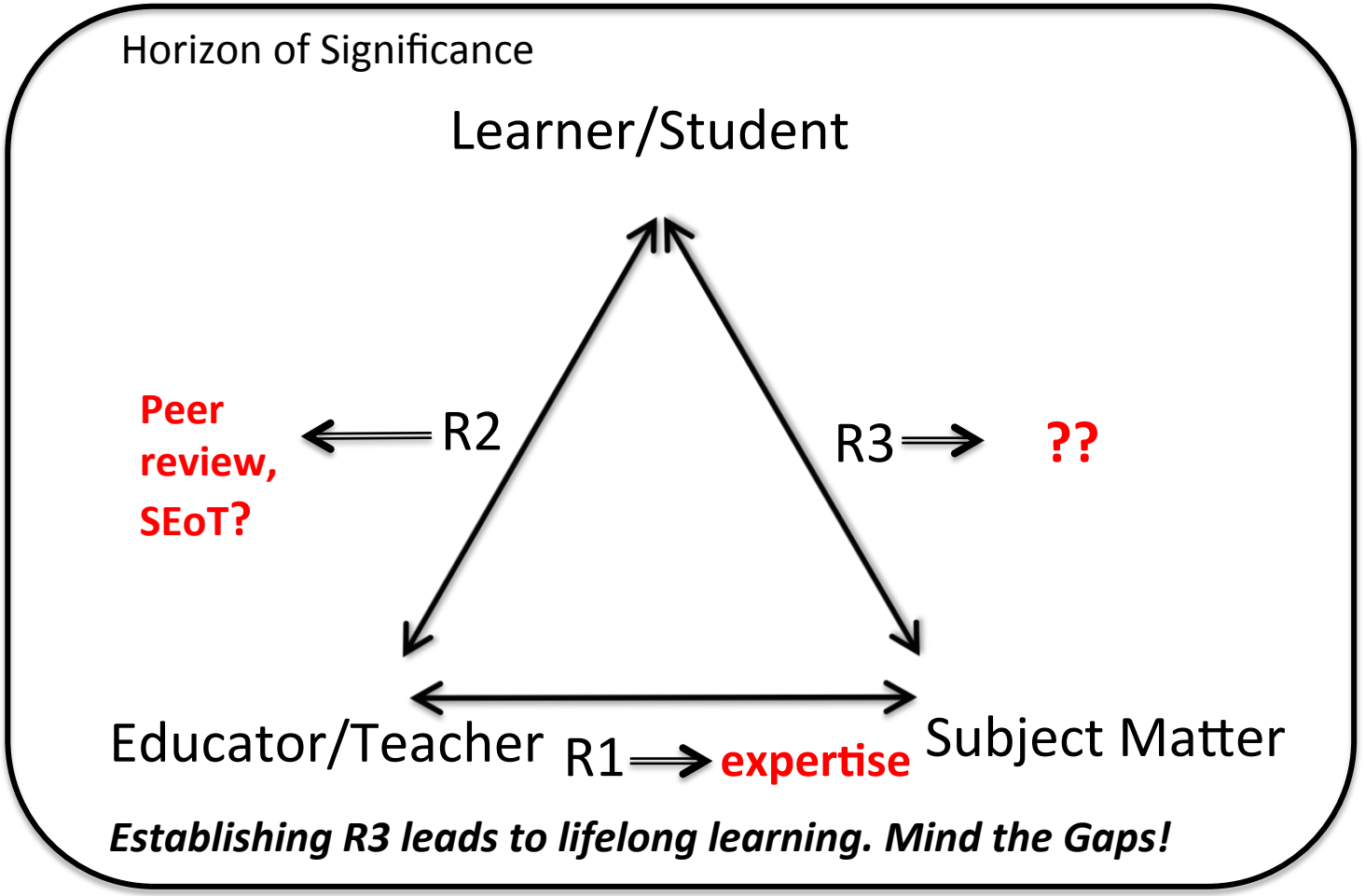
Motivation: Literature



Inspired by Kreber (2007), Parker Palmer (1998), Charles Taylor (1991) based on 'Authentic teaching' framework.

Life-long learning is one of the 12 graduate attributes set by CEAB.

Research Question



HOW DO WE ASSESS THE RELATIONSHIP R3 FOSTERED BETWEEN THE STUDENT AND THE SUBJECT MATTER during THE COURSE?

What is R3 in a Course?

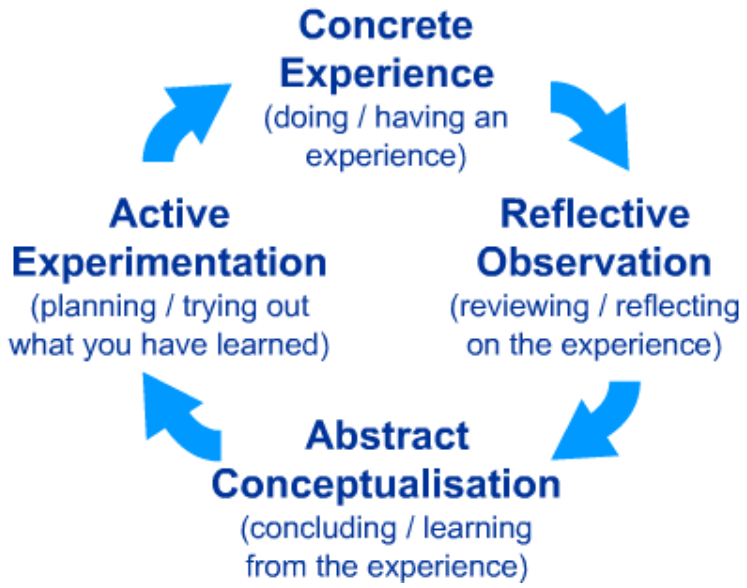
1. A function of student's developing attitudes towards the subject, engagement with the subject, preparedness to learn, metacognition (inspecting one's own learning), self analysis and reflection ….

2. In the current setup we have little to no information on the above. Most students can quantify R2 (ex: SEoT) but not R3. **Assessment challenge to quantify R3?**

3. The lens needs to be focussed on the learner in order to know more about R3 which falls outside conventional summative assessment.

Literature

Reflective thinking driven by experiential learning is a valuable professional skill for an engineer. Reflection is a key component of Kolb's cycle of learning. Critical reflection leads to transformative adult learning resulting in changes in frames of reference (Mezirow 1998).



http://www.ldu.leeds.ac.uk/ldu/sddu_multimedia/kolb/static_version.php

Literature

1) Burrows, V.A., McNeill, B., Hubele, N.F., Bellamy, L., 2001 "**Statistical Evidence for Enhanced Learning of Content through Reflective Journal Writing**," Journal of Engineering Education, pp. 661-667
2) Seepersad, C. C., M. Green and K. Schmidt, 2006, "**Learning Journals as a Cornerstone for Effective Experiential Learning in Undergraduate Engineering Design Courses**" ASEE Annual Conference and Exposition (R.J. Eggert Ed.), Chicago
3) Broadway, F.S., Qammar, H.K., Evans, E.A., Spickard-Prettyman, S., 2005 , "**The use of reflective journals for student learning and development**," *Frontiers in Education, 2005. FIE '05. Proceedings 35th Annual Conference.*
4) *Palmer, S, 2004, "**Evaluation of an on-line reflective journal in engineering eduction**," Computer Applications in Engineering Eduction, Vol. 12, pp. 209-214.*

Methodology

1. Learning Styles: Felder-Solomon's ILS; Myers-Briggs' MBTI
2. Develop a **Compact, Structured**, Learning Journal to guide the reflection process, while keeping it sufficiently open. Weekly reflections on lectures, tutorials, homework, assignments etc.
3. Understand student's evolving learning patterns during the course and the impact of learning journal on a student's performance and their overall relationship with the subject, R3. Evidence: SEoT and Course performance

Challenges & Opportunities

1. **Buy-in** from students: course requirement. MECH 2 uses some online learning style inventories
2. **Time**: make the learning journal compact and weekly.
3. **Structure**: Which questions to ask? A constant refinement and iteration is needed.
4. **Feedback**: peer, instructor, or both?
5. **Assessment**: objective assessment remains a critical challenge. A rubric? Formative?

Potential Implications

1. May lead to improved engagement with the subject matter outside the class room
2. If successful, may inspire application of the learning journals concept across several courses. Ideally one would like to see how a student develops throughout the program, not just in a single course.
3. Above all, may lead to the development of the life-long learning attribute required by CEAB (Canadian Engineering Accreditation Board).

Thank You
Any Questions & Feedback?