Title: Learning Gain and Confidence Gain as Metrics for
                    Pedagogical Effectiveness

Presenter: Fabio R. Aricò
                    University of East Anglia

Session Learning Outcomes

By the end of this session, delegates will be able to:

- Challenge the concept of learning gain, extending it to the domain of student confidence, and self-efficacy beliefs.
- Experiment with active learning pedagogies that can promote the formation of cognitive skills, as well as meta-cognitive skills, at the same time.
- Design metrics to evaluate learning, and account for learning gain and confidence gain in the classroom.

Session Outline

This presentation details the most recent results and outputs of an HEFCE funded pedagogical research project aimed at investigating the concept of 'learning gain' as a measure of pedagogical effectiveness. Our approach originates from the principle that students ought to develop positive self-efficacy beliefs (Bandura, 1977; Pajares, 1996) as they progress over their academic journey. We re-enforce this concept by suggesting that student confidence should represent a learning outcome in its own right (Ritchie, 2015). In other words, we claim that the development of student self-efficacy should: (i) run parallel to every academic curriculum, and (ii) be subject to assessment and evaluation, along with the accumulation of knowledge, practical, and critical skills. To achieve this objective, we design and evaluate a pedagogical approach where students and staff can promote and track the simultaneous formation of learning gain and confidence gain.

In the first part of the presentation we describe our teaching approach, which combines pedagogies such as self-assessment and Peer-Instruction (Aricò, 2016; Mazur, 1997), to facilitate the creation of an active learning environment for a large-class undergraduate module in Economics. In the second part of the presentation we introduce our definitions of learning gain and confidence gain. Thus, we describe how these definitions can be employed to develop an evidence-based evaluation of our teaching approach. We argue that a comprehensive appraisal of teaching quality should evaluate learning gain in relation to measures of student self-assessment skills and self-efficacy beliefs. Therefore, we investigate the interplay of these metrics to assess pedagogical effectiveness. Our preliminary

results confirm the presence of a strong and positive association between learning gain and confidence gain. This finding confirms the pivotal contribution of active learning pedagogies in fostering student confidence and positive self-efficacy beliefs.

Session Activities and Approximate Timings

- This session will involve:
    - a presentation of concepts and evidence through PowerPoint and time for discussion and clarification (15mins+5mins);
    - a demonstration of our teaching approach using Student Response Systems, including peer-instruction (5mins+5mins);
    - a conclusion of the session with final questions and answers, and discussion (15mins).

- Topic questions:
    - What is the relevance of student confidence and self-efficacy skills for learning? How should we measure them?
    - Can we devise easily scalable metrics of learning gain and confidence gain that can be seamlessly implemented across the disciplines?
    - What is the role of active learning pedagogies in: (i) fostering the development of student self-efficacy, and (ii) devising metrics to evaluate this process?
    - What can be done to improve this pedagogical approach?

References

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- Mazur, E., (1997), "Peer Instruction: A User's Manual", Englewood Cliffs: Prentice Hall.
- Pajares, F., (1996), "Self-Efficacy Beliefs in Academic Settings", *Review of Educational Research*, 66(4), pp. 543-578.
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