

EXPLORING STUDENT AND TEACHER PERCEPTIONS OF A NOVEL ASSESSMENT METHOD TO ENHANCE LEARNING AND ENGAGE STEM STUDENTS

Helen Bremert

Contact Author: hbre8322@uni.sydney.edu.au

The University of Sydney, NSW, Australia.

THEME:

Teacher education and professional learning in STEM; Engaging students in STEM education; Innovative STEM pedagogy and curriculum

BACKGROUND AND AIMS

The poster describes a study designed to explore collaborative testing, to isolate the extent of whether this formative assessment method can improve student learning as an addition to current practices of individual, competitive testing. Collaborative assessments emphasise the use of collaborative, learning-focused practices to enhance engagement in high school STEM classes. The study design draws on Deweyan pragmatism to explore (i) teachers' perceptions of the utility of collaborative testing (ii) students' and teachers' views on the effectiveness of collaborative assessments on learning. To address this novel approach to assessing, the researcher will use a multi-phase, collaborative practitioner inquiry study involving teachers and the researcher in a reciprocal relationship, investigating the use and efficacy of collaborative, rather than individual, formative testing.

METHODOLOGY

STEM teachers will be invited to participate in focus groups exploring how best to implement collaborative testing in their classrooms. An iterative cycle of inquiry will then be implemented involving phases of collaboratively assessing students, followed by collaborative reflection between teacher and researcher and students and researcher. Students will be audio-recorded during testing and focus groups, to analyse student discourse. Effective discussions between peers lead to cognitive growth, allowing a fuller picture of how collaborative assessments may enhance student learning and engagement.

IMPLICATIONS

The poster summarizes the two main areas of the research literature underpinning the study design. First, high stakes testing in STEM students; and second STEM teachers' pedagogy concerning collaborative work in the classroom. In both cases, specific attention is given to examining whether a different assessment method, such as collaborative testing, can abate the documented effects of individual summative testing. Given current preferences for teachers' accountability and measurable outcomes, students undertake multiple assessments measuring their learning at a single point in time, each affecting their depth of learning, engagement with the subject, and sense of who they are as a student. Further, teachers' pedagogical practices may be modified by the effects of high stakes testing as they move from collaborative work in the classroom to more 'teach to the test' methods, further reducing student engagement. Many significant studies investigating the advantages of collaborative learning have been undertaken, promoting the constructivist approach of collaboration in the classroom and yet the behaviourist methods are still prevalent when assessing students. This

discrepancy leads to the question: if collaboration is widely recognised as enhancing learning, why does the reliance on individual testing persist?



Exploring student and teacher perceptions of a novel assessment method to enhance learning and engage STEM students

Helen Bremer, Dr Debra Talbot, Dr Nicole Brunker, Professor Jim Tognolini, The University of Sydney

Background

- "Students' interest in, valuing of, and expectation to succeed in math or science are the most immediate determinants of their achievement in those domains" (Tobin et al., 2011, p. 48)
- STEM classes using an active, diverse pedagogy can increase student performance and subject beliefs and equity
- Students undertake behaviourist assessment methods, impacting the classroom environment and student learning.
- These methods affect students' depth of learning, subject and performance beliefs, and sense of who they are as a student
- This discrepancy between how we teach in STEM collaborative classrooms and how students are assessed leads to the guiding question for this study

Question

If collaboration is widely recognised as enhancing learning, why does the reliance on competitive individual testing persist?

Methodology

This study will utilize a multi-phase, collaborative practitioner inquiry methodology, involving teachers and the researcher in a reciprocal relationship, to investigate the use and efficacy of collaborative, rather than individual, summative testing.

Research phase 1

- Teacher recruitment
- Qualitative research methods: semi-structured interviews and professional learning workshop
- Planning collaborative assessments
- Planning equitable heterogeneous groups

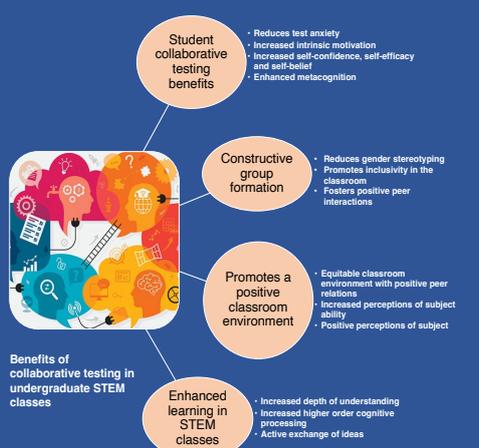
Research phase 2

- Implementation of collaborative testing
- Three iterative cycles of student testing directly followed by teacher reflective discussions

Research phase 3

- Qualitative research methods: student focus groups and semi-structured teacher interviews, optional teacher focus group

Data analysis: Reflexive thematic analysis



Student collaborative testing benefits

- Reduces test anxiety
- Increased intrinsic motivation
- Increased self-confidence, self-efficacy and self-belief
- Enhanced metacognition

Constructive group formation

- Reduces gender stereotyping
- Promotes inclusivity in the classroom
- Fosters positive peer interactions

Promotes a positive classroom environment

- Equitable classroom environment with positive peer relations
- Increased perceptions of subject ability
- Positive perceptions of subject

Enhanced learning in STEM classes

- Increased depth of understanding
- Increased higher order cognitive processing
- Active exchange of ideas

Group formation

- Effective collaborative testing depends on a positive classroom environment and the cohesiveness and structure of student groups.
- Positive inclusive collaborative classroom mitigates the effects of an individualistic competitive classroom
- Adverse classroom environments can lead to competition, confrontations, gender bias and stereotyping of gender roles
- Group formation in classrooms has traditionally been based on gender, without considering impacts on equality and learning
- Gender and personality differences affect the group functioning due to different life experiences, perspectives, cultural backgrounds and temperaments. All of which impact the "groups cognitive complexity" (Cassidy et al., 2012; Hesse-Biber et al., 2016)
- Gender-inclusive classrooms lessen gender-based biases in the group, positively impacting students' learning and engagement.

Implications

- Aiding teachers in facilitating collaborative-based assessment tasks that reflect classroom pedagogy
- Providing support for teachers in determining equitable and effective groups for collaborative learning and assessments to promote positive classroom environments
- Ascertaining teachers' perceptions of whether the process of a summative collaborative assessment differs from an individual summative assessment
- Determining teacher and student views on the effectiveness of collaborative assessments to enhance learning and engagement in STEM classes



Helen Bremer
Dr Debra Talbot
Dr Nicole Brunker
Professor Jim Tognolini

