

What is Rigorous Research in Engineering Education?

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Abstract - This Interactive Session will provide an active learning environment where participants will: Compare and contrast rigorous research in engineering disciplines and rigorous research in engineering education, and Discuss how the six principles described in *Scientific Research in Education* can be applied to engineering education research.

Index terms – Research models, educational research, engineering education research, research paradigms

INTRODUCTION

There's been a lot of talk in engineering education circles about "rigorous research in engineering education." But what does "rigorous" mean in terms of engineering education research?

The proposed session investigates this question by using exercises developed for NSF-funded workshops on conducting rigorous research in engineering education (DUE-0341127). Specifically, the session will focus on participant-generated comparisons between rigorous research in engineering disciplines with rigorous research in engineering education.

Goals of the session

This session will provide a collaborative learning environment where participants will:

- Compare and contrast rigorous research in engineering disciplines and rigorous research in engineering education
- Discuss how the six principles described in *Scientific Research in Education* can be applied to engineering education research.

SESSION TOPICS AND TIMELINE

Participants will be assigned to teams based on their discipline (mechanical engineering, chemical engineering, electrical engineering, etc) and will work in these teams

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throughout the workshop. We have used this format in prior interactive sessions and found that it provides the opportunity for participants to hold rich and fruitful discipline-based discussions with colleagues at other institutions.

Outline

- Overview and formation of discussion teams
- Small group exercise – what defines rigorous research in your engineering discipline?
- Small group exercise – what defines rigorous research in engineering education?
- Whole group comparison of team definitions
- Discuss six principles of *Scientific Research in Education*
- How does this inform one's definition of rigorous engineering education research?
- Small group exercise – revisit and revise definition of rigorous research in engineering education
- Revised definitions shared with the whole group.
- Concluding statements by presenters

EXPECTED OUTCOMES (LEARNING OBJECTIVES)

- Participants will be able to compare and contrast rigorous engineering research and rigorous engineering education research.
- Participants will be able to list the six principles of *Scientific Research in Education* and use those principles to construct a definition of rigorous engineering education research.

**RELATED PEER-REVIEWED PAPERS BY SESSION
PRESENTERS**

[1] Streveler, R. A. & Smith, K. A. (2006). Guest editorial: Conducting rigorous research in engineering education. *Journal of Engineering Education*, 95 (2), 103-105.

[2] Streveler, R. A., Borrego, M., & Smith, K. A. (2006, in press). Moving from the 'scholarship of teaching and learning' to 'educational research': An example from engineering. In D. R. Robertson (Ed.), *To Improve the Academy*, 25. Bolton, MA: Anker.

[3] Borrego, M., Streveler, R.A., Chism, N., Smith, K.A., and Miller, R.L. (2006, June). Developing an Engineering Education Research Community of Practice through a Structured Workshop Curriculum. *Proceedings of the Annual Conference of the American Society for Engineering Education*, Chicago, IL.

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