

# Special Session - Developing Engineering Student's Philosophical Inquiry Skills

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**Abstract** - This special session provides an opportunity for participants to engage in a reflective dialogue on the topic of developing student's philosophical inquiry skills. The session will provide participants with a cooperative inquiry environment intended to help engineering educators identify, evaluate, and synthesize a more coherent view of engineering education from a philosophical perspective. Also, this session will advance the ongoing discussion about the philosophical underpinnings of engineering education practice. Note: this special session is designed as a partner session to another special session: Heywood, Grimson, & Korte, *Teaching Philosophy in Engineering Courses*, Session M4A and a supporting paper by Heywood, Grimson, & Korte, *Teaching Philosophy to Engineering Students*, also in Session M4A.

*Index Terms* - Philosophy, Cooperative Inquiry, Critical Thinking

## INTRODUCTION

One task of philosophy is the systematic ordering of thoughts, beliefs, ideas, and habits into a coherent view of reality. For engineering educators, the process of philosophical inquiry helps to systematically identify, evaluate, and synthesize a vast array of ideas regarding engineering education into a more coherent system to guide practice.

Rather than striving to articulate a single philosophy of engineering education, participants will be encouraged to reflexively and critically develop their knowledge and skills for philosophical inquiry by collaboratively thinking, discussing and articulating their:

- Views about the nature of reality (related to the profession and the practices of engineering and education).
- Views about the nature of learning (inside and outside of formal instructional settings).
- Views about the nature of morals and ethics in education and engineering.
- Views about the aesthetics of education and engineering.

As mentioned above, one task of philosophical reasoning is the systematic ordering of ideas and beliefs into a coherent view of reality. The systematic ordering is based on the available data (cultural beliefs, values, social systems,

and the technical knowledge of science). The outcome of this reasoning is to find the best available answer to a problem, rather than the best possible answer [1]. Furthermore, Searle argues that philosophical information is historically grounded and socially situated. This has important implications for the preparation of engineering students for the profession in the 21<sup>st</sup> century. Thus, even though the reality of the world is objective (it exists independently of our mental states) the reality of our knowledge is subjective and grounded in history [2]. From this perspective it is important for engineering educators to articulate and challenge the bases of knowledge in engineering that make up much of engineering education.

Our approach during the session will be based on cooperative inquiry [3]-[4]. Part of the rationale for our approach is based on arguments from McKeachie [5]:

Student participation, teacher encouragement, and student-student interaction positively relate to improved critical thinking. These three activities confirm other research and theory stressing the importance of active practice, motivation, and feedback in thinking skills as well as other skills. This confirms that discussions. . . are superior to lectures in improving thinking and problem solving. . . We conclude that at least three elements of teaching seem to make a difference in student gains in thinking skills: (1) student discussion, (2) explicit emphasis on problem-solving procedures and methods using varied examples, and (3) verbalization of methods and strategies to encourage development of metacognition. (p. 1).

Additionally our approach is based on the work of Donald Schon and Stephen Brookfield. See Smith [6] for a summary of Schon's *Educating the Reflective Practitioner* and Brookfield's *Becoming a Critically Reflective Teacher*.

There was a strong interest in examining the philosophy of engineering at the FIE conference in 2007. In addition, at the FIE conference in 2008, the topic demonstrated continuing interest and expanded to include the philosophy of education. It is a common belief that everyone conducts his or her practice based on some form of philosophy. However, few people might have directly addressed the content of their philosophy for educating engineers or articulated the coherency of their beliefs and values. This session will provide participants with a method to begin this process and more deeply uncover and examine the

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philosophical data that guide their work as engineering educators.

### SESSION CONTENT

The moderators will facilitate the analysis and discussion of these topics using brief presentations, group and individual worksheets, small group discussion and report. We realize that 90 minutes is not much time and we will focus the session on presenting a method of philosophical inquiry, along with providing simple tools to facilitate the inquiry.

1) Introduction: the session begins with a brief background, followed by an introduction to methods for analyzing personal philosophies of engineering and education (~15 min.).

2) The audience will be broken into small groups to identify and discuss various philosophical views held by members of the group. The philosophical views will focus on the nature of reality and learning within programs of engineering education (45 min.).

3) Groups report back a brief summary of their discussions (20 min.).

4) Facilitators wrap up and close the session (10 min.).

### SESSION GOALS

This session will provide participants with a cooperative inquiry environment, which is intended to:

1) Help engineering educators identify, evaluate, and synthesize a more coherent view of engineering education from a philosophical perspective.

2) Advance the ongoing discussion about the philosophical underpinnings of engineering education practice.

### ANTICIPATED AUDIENCE

The anticipated audience includes educators who are interested in actively engaging with others in exploring engineering education philosophy. Our assumption is that everyone conducts his or her practice under the influence of some set of assumptions pertaining to the philosophical domains the nature of reality, learning, ethics, and aesthetics.

This workshop provides an opportunity to reflect on and talk with others about these assumptions.

### EXPECTED OUTCOMES

The principal outcome of this session is to provide participants with a process for analyzing the philosophical underpinnings of their personal and professional philosophies regarding engineering education. An additional outcome of the session is to advance our philosophical inquiry into further exploring these ideas through papers and continuing discussion.

### REFERENCES

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