

Special Session: Agents for STEM Change – Articulating the Goals of Our Community

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Abstract— Engineering and Computer Science (E&CS) Education is an emerging discipline with a brief history and the unfortunate particularity that many folks outside our discipline are confused as to our purpose. In this special session, we will use two case studies to frame the larger questions around E&CS Education goals and help draw the conversation from practice to philosophy while creating a safe space for open conversation.

Keywords—special session; organizational change; case study; goals of engineering and computer science education

I. INTRODUCTION

We attend FIE partly because we want to make positive change in Engineering and Computer Science (E&CS) education and, through that, in our world at large. E&CS Education is an emerging discipline with a brief history and the unfortunate particularity that many folks outside our discipline are confused as to our purpose. As a consequence, the goals for the E&CS Education disciplinary community have largely been surface layer objectives provided by reports and outside groups, e.g. increase the number of students studying E&CS fields. While we need the surface layer objectives in our portfolio, we also need to have the deeper conversations within our community regarding what we want and why we exist. Without the deeper discussion, we have a limited understanding of the real impacts of the proposed objectives, intended and otherwise. This special session will create a safe space for this deeper discussion among a cross-section of the FIE community. The deeper goals of our discipline not only help us answer the larger questions of how we serve society and empower people, they also help us evaluate the meaning, efficacy, and desirability of objectives provided to us.

The goals of this special session are:

- To explicitly identify the goals of Engineering and Computer Science Education based on historical context and discussion.
- To open the conversation on the future goals of Engineering and Computer Science Education to a broader audience.

- To articulate goals for our community based on the larger issues of how Engineering and Computer Science does, and should, serve society.

II. CASE STUDY APPROACH FOR THE SESSION

In this special session, we will use two case studies to frame these larger questions and help draw the conversation from practice to philosophy while creating a safe space for open conversation. The case studies are a product of the Engineering Education Research NetWorkshop (NSF grant numbers 1314725 and 1314868) and will be used to frame these larger questions. They are aggregated experiences that have been formed into a story most folks in the community can recognize from their own work. Both case studies are from the viewpoint of individuals in roles common to the mid-career faculty member and involve the mechanisms we use to explain the value of E&CS Education in a way other people find compelling. One case study focuses on interactions with the upper levels of the administration while the other focuses on interactions with other faculty, staff, and students

A. Case Study: Managing Up to Make Change

This case study considers a faculty member who is thrust into quasi-administrative role when changes in her department staffing leave her one of the most senior faculty in her discipline, even though she does not yet have tenure. In order to protect and advance her discipline and her department, she undertakes a crash course in managing up – working with the dean and provost to manage the change process and help adjust the college-level goals to be more palatable for all involved.

B. Case Study: Change Among Peers and Students

In this case study the chair of an engineering department finds himself having to navigate course and curricular changes that had been proposed by his predecessor. The proposed changes were developed during a faculty meeting in which all members of the department suggested ideas which were then ranked by popularity. As the chair seeks to rally support in moving from ideas to actions, he finds that underlying seemingly simple course changes are layers of unstated

assumptions and beliefs which are deeply held but poorly articulated. As frustrations build faculty discover that while they all are speaking the same words—"design", "problem solving", "hands-on experiences"—their conceptions of these differ greatly from those of their colleagues.

The case study explores how differing beliefs of faculty along with the inability to clearly articulate can paralyze a change process even when on the surface there is a clear consensus for change. The case study also discusses common mistakes in managing departmental changes including shutting down opposing views, assuming everyone draws upon the same information, and not carefully considering both potential gains and losses. The case study contrasts lived academic experiences with published change models, pointing out areas where these align and examples where best practices can fall short.

III. OUTCOMES AND FUTURE MOVES

This special session is a beginning. The expected outcome is a broader basis for the facilitators and other interested individuals to continue these discussions. Ultimately, we hope to articulate how the discipline of Engineering and Computer Science Education serves society and empowers individuals and toward a better understanding of the issues facing our community as we act as change agents to achieve these goals.

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