Developing a framework for collaborative educational change: A study of people, processes, and cultures

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***Abstract*— This Work-in-Progress Research paper presents a conceptual and methodological framework for the study of collaborative educational change efforts, based on principles and measurement tools from educational philosophy and organizational change. Our approach draws on Schein's framework for cultural analysis, and utilizes measurement tools from several research domains to investigate the goals, values, beliefs, and identities of individuals engaged in educational change. Our preliminary findings suggest that there are significant perceived misalignments experienced by changemakers in relation to their institutions, and these differences impact their change efforts. Future work includes additional data collection and action-research projects to test various models of change.**

Keywords—educational change, innovation, curricular culture, educational values, learning beliefs, professional identity

I. Introduction

National and international calls for change in engineering education have continued to garner support and momentum [1], [2], [3], [4]. Within this context, there is increased desire for, and emphasis on, sharing curricular practices across institutions, collaborating on multi-institutional initiatives, and critically examining and shifting educational paradigms. With collaboration, however, comes complexity. Educators approach change with diverse backgrounds, and different viewpoints on *how* and *why* engineering education needs to change. These differences are visible on individual and collective (i.e. departmental or institutional) levels, but they often remain implicit and unexamined.

This paper is part of a larger study aimed at understanding how educators engage in collaborative educational change. We argue that making educational values, beliefs, and goals explicit enables more effective, collaborative, and mutually supportive change efforts among educators and institutions concerned with educational reform. Here, we present the research study architecture and preliminary findings for a project directed at articulating the diversity of people, processes, and cultures involved in educational change initiatives.

We begin by describing the conceptual framework underpinning this study. The framework was developed through working with a pilot data corpus, which includes interviews and observations of faculty participating in collaborative educational change across institutions over several years and various forms, such as visiting faculty programs, formal partnerships, and educational design workshops. Next, we outline the research study architecture based on this framework. Finally, we present preliminary findings and plans for future work.

II. Conceptual Framework

Based on our pilot data corpus of interviews and observations with faculty engaged in educational change efforts, we articulate three dimensions of educational change initiatives that changemakers implicitly or explicitly choose:

- *What – the practical features of the change initiative,* including the scale of change (course, department, program, institution, discipline/field, or broader scale); disciplinary focus; and timeline
- *How – the process engaged to develop and implement the change initiative*, including the idea's origin (adapted from a model at another institution, emergent from a student-centered design process, etc.); the people involved (who are the decision-makers, instigators, implementors, etc.); and the pathways of implementation (mainstream, experimental, etc.)
- *Why – the underlying motivation for the change initiative*, including desired outcomes and impacts; values and beliefs; and world views (i.e. change to what end?)

To the extent that the details of these three dimensions are implicit or unclear, there is a risk of misunderstanding and confusion on collaborative teams. Though individuals on a collaborative team might be in agreement around the practical features of a change initiative, they might have very different underlying motivations for the change initiative. Research shows that educators' conceptualization of learning shapes their decisions around design of educational experiences and influences their acceptance or rejection of learning innovations [5], [6], [7], [8], [9]. Thus, differences in desired outcomes, values and beliefs, and conceptualizations of teaching and learning will undoubtedly become visible at some point in the collaboration process.

In previous work, we have found it useful to frame curricular change as culture change in order to describe the

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shared basic assumptions of a group regarding teaching and learning, and the ways in which they tangibly manifest [10]. We draw upon Schein's definition of culture, which depicts it as operating on three levels [11]:

- *Artifacts – "visible and feelable phenomena,"* including a group's physical space, the myths and stories it tells, its published values and goals, and observed behaviors
- *Espoused beliefs and values – "ideals, goals, values, aspiration,"* including articulations of why a group does what it does
- *Basic underlying assumptions – "unconscious, taken-for-granted beliefs and values,"* including those that operate in shaping behavior, perception, thought, and feeling

Schein also describes the way in which an individual can be understood as a cultural entity, similarly embodying all three levels of culture. Thus, in considering collaborative educational change initiatives, we can apply Schein's framework on multiple levels: the individual changemaker, the team of changemakers, and the institution(s) in which they seek to implement that change. This perspective offers us a window into the complexity at play on collaborative teams seeking educational change that may introduce new ideas and values into an existing cultural context. Not only can we conceptualize culture change occurring at an institutional level, but also at a team and individual level. Consider the added layers of complexity on teams that span multiple nationalities, institutions, and disciplines.

III. Research Study Architecture

Using both the three dimensions of educational change initiatives that emerged from pilot data (*What, How,* and *Why*), and Schein's framework for culture, we developed a mixed-mode research study with several phases. The approach in our first phase involves disseminating a collection of questionnaires to educational changemakers, primarily in higher education and technical fields, using tools adapted from a variety of sources: Bolhuis and Voeten's Learning Inventory [12], Cech's professional identity trait measure [13], the Building Blocks of Innovation Survey [14], and a questionnaire we developed from a framework for educational purposes, values, and goals [15], [16]. Our goal is to explore how these factors relate to one another, and examine how alignments or misalignments may dynamically emerge and transform during collaborative educational change initiatives.

A. Learning Inventory

The Learning Inventory, as described by Bolhuis and Voeten [12], is a set of paired statements regarding teaching and learning. For each pair of statements, one is more process-oriented and one is more traditional (randomized order, assigned A and B). Respondents are asked to select from the following four-point scale: 1) I strongly agree with A, 2) I agree somewhat more with A than B, 3) I agree somewhat more with B than A, and 4) I strongly agree with B. The Learning Inventory includes statements about student learning and statements about faculty learning, and these are aggregated into five factors. The five factors are presented as opposing conceptions of student learning: external versus internal regulation, reproductive versus constructive knowledge, individual versus social learning, fixed versus dynamic ability, and low versus high tolerance of uncertainty. We asked respondents to complete the Learning Inventory survey according to their beliefs, and then according to their perception of the beliefs of "people at my institution." The Learning Inventory provides a lens into Schein's second level of culture: the espoused beliefs and values of educators regarding teaching and learning.

B. Professional Identity

Cech's professional identity trait questionnaire [13] measures the extent to which individuals personally identify with or perceive the importance of different skills, capacities, and values related to professional careers. Professional identities are the "'relatively stable and enduring constellation of attributions, beliefs, values, motives, and experiences in terms of which people define themselves in a professional role' (Ibarra 1999:764, referencing Schein 1979)" [13]. The four professional identity trait measures are: 1) Problem-solving prowess (problem-solving skills, personal persistence, attention to detail, working in teams, maintaining updated skills and expertise), 2) Technological leadership (making important scientific discoveries, creating/managing future technologies, inventing new technologies, being a leader in my field), 3) Managerial/communication skills (writing skills, leadership skills, social skills), 4) Social consciousness (improving social, being active in my community, promoting racial understanding, helping others). In each case, respondents were asked to rate the importance of each item from 1 = very unimportant, to 5 = very important. Subsequently they were asked the identical set of questions for "people at my institution." The professional identity instrument provides a lens into Schein's second level of culture, as it illuminates individuals' beliefs and values about how learning ought to prepare students for professional careers.

C. Building Blocks of Innovation

Faculty engaging in educational change initiatives often describe institutional road blocks or passages that shape the development and implementation of their efforts. In order to gain specificity with respect to these structural aids and hindrances, we draw upon research in organizational culture and innovation.

The Building Blocks of Innovation Survey was created to help companies assess their innovation strengths and weaknesses [14]. We adapted the survey for educational institutions by substituting "student" for "customer," and "faculty" for "employee," etc. The tool has fifty-four elements, which are aggregated into eighteen factors (of three elements each), and six building blocks (of three factors each). The six building blocks are values, behaviors, climate, resources, processes, and success. For each of the fifty-four elements, respondents rate their institutions on the scale: 1 = not at all; 2 = to a small extent; 3 = to a moderate extent; 4 = to a great extent; 5 = to a very great extent.

Though the "values," "behaviors," and "climate" components of the Building Blocks of Innovation Survey might suggest the second level of Schein's culture framework, the elements describe *visible* features that indicate an underlying set of organizational values. Thus, this tool ideally describes some of the artifacts (Schein's level one of culture) within an institution's culture that may promote or hinder educational innovation.

D. Purpose of Education

Historians and educational philosophers have found that the answer to the question, "What should be the aims of education?" varies over time and culture [17]. However, for the general public and for many educators, asking this question might not make sense, as though the definition of "education" is self-evident. In this way, we view perspectives on the purpose of education to be largely in the realm of underlying assumptions, as defined by Schein's three levels of culture [11]. These underlying assumptions usually only become visible when they bump up against contradictory underlying assumptions. As Schein describes, "if a basic assumption comes to be strongly held in a group, members will find behavior based on any other premise inconceivable" [11]. We have seen this sort of misunderstanding and confusion when faculty from one institution visit another institution with a different curricular culture [18].

To characterize respondents' perspectives on the purpose of education, we draw upon a report to UNESCO of the International Commission of Education for the Twenty-first Century, entitled, *Learning: The Treasure Within* [15]. The report describes four "pillars of learning," which are "learning to know," "learning to do," "learning to live with others," and "learning to be." We adapted the report's description of these four pillars into a survey format, where respondents were asked, "To what extent do you feel that the purpose of education is to contribute to each of the following?" A five-point scale was used, from 1 = not at all, to 5 = to a very great extent. The statements that fall under each of the four pillars are as follows:

Learning to know

a) Help students acquire a general body of knowledge
b) Help students develop a sense of curiosity
c) Help students develop the desire the gain a better understanding of the world and other people
d) Help students acquire in-depth knowledge on a selected number of subjects

Learning to do

a) Help students acquire vocational skills to practice a profession or trade
b) Help students develop the ability to work in teams
c) Help students develop the ability to adapt to a variety of often unforeseeable situations

Learning to live with others

a) Help students develop tolerance for people different to themselves
b) Help students develop understanding of people/backgrounds/religions, etc. different to their own
c) Help students develop the ability to work with others different to themselves

Learning to be

a) Help students develop their individual creative potential
b) Help students develop their self-esteem
c) Help students develop their full human potential

In addition to asking respondents to consider each of these statements from their own perspective, we also asked them to respond to each of the statements, considering, "To what extent do people at your institution feel that the purpose of education is to directly contribute to each of the following?"

IV. Preliminary Findings

The present dataset includes responses from 90 educators engaged in change initiatives at 54 institutions across 17 countries. The participant group includes 56 (62%) men and 34 (38%) women.

In addition to completing the four questionnaires detailed in the previous sections, respondents were able to record any comments, questions, or insights in an optional text box at the end of each questionnaire. These qualitative data reveal valuable contextualization for the quantitative characterizations, and suggest interesting directions for inquiry in the ongoing investigation. Preliminary findings are discussed below in this context, while detailed presentation of the data is presented elsewhere [19].

A. Overall Alignments and Misalignments

Paired t-test analyses were performed for the three surveys that asked participants to respond for themselves and for "people at their institution." Across all three surveys (Learning Inventory, Purpose of Education, and Professional Identity), participants indicated significant differences between their own beliefs, identities, and values, and those of their institution.

For the Learning Inventory, respondents reported that their learning beliefs are significantly more process-oriented, whereas their colleagues' beliefs are more traditional. In the Purpose of Education survey, respondents reported valuing three out of the four kinds of educational goals (*doing, being,* and *relating*) more than people at their institution, though they reported good alignment with their institutions on *knowing* educational goals. The professional identity measures revealed significant differences between how respondents value certain professional identity traits and how their institution values the same professional identity traits. Respondents rated the importance of management/communication skills and social consciousness significantly higher to themselves than to their institutions, while there was reasonably good alignment around the importance of problem-solving prowess and technological leadership.

The preliminary data also revealed examples of alignment and misalignment in self-reported beliefs, values, and identities

within groups of respondents from the same institution. While our dataset does not yet contain sufficient samples of individuals working together on a collaborative change project, we are interested in how this type of alignment/misalignment might play out in collaborative educational work.

B. Barriers to Change

In their qualitative comments, study participants described a wide variety of barriers to change, which align with their somewhat low ratings of their institution's "building blocks of innovation." Table 1 depicts the mean ratings for each of the six building blocks, alongside a participant quote describing a specific barrier to innovation at their institution.

TABLE I. BUILDING BLOCKS OF INNOVATION SURVEY RESULTS. N=89. (SCALE: 1=NOT AT ALL; 2=TO A SMALL EXTENT; 3=TO A MODERATE EXTENT; 4=TO A GREAT EXTENT; 5=TO A VERY GREAT EXTENT).

Building Block	Mean	Std. Dev.	Descriptive Quote
Values	3.09	0.91	"Any innovation currently happening is very grass-roots and is often implicitly or explicitly opposed by leadership"
Behaviors	2.97	0.94	"We are still not great at connecting the right folks to initiatives and/or training all folks involved in innovative thinking and problem solving"
Climate	3.01	0.81	"The overall political climate in the country has created a distracting environment at many levels. It's hard to do new things because so much attention is on larger scale issues"
Resources	3.05	0.85	"We are paralyzed by an institutional budget crisis that makes the availability of future resources uncertain"
Processes	2.67	0.85	"Because it is a public university, there is a lot of internal bureaucracy that slows down and hinders the agility and efficiency of the processes"
Success	3.16	0.90	"We get stuck or just have often painful moments because we are mixing traditional with forward thinking"

C. Informative Caveats

Participants recorded several caveats or limitations to their responses, which in and of themselves point to the cultural and contextual nature of their experiences. Three themes that stood out are as follows:

Enacted vs espoused: "I had some difficulty completing the middle set of rankings because I feel that there is a disconnect between what the teachers at my institution would state as the purpose of education and how they actually teach." This observation corroborates Schein's model, in that the espoused beliefs and values can differ from the basic underlying assumptions that actually shape behavior – a disconnect between *desired* and *observed* behavior [11].

Situational vs global: "I notice that my answers reflect my beliefs and ideals in general. If I consider these questions in real-time context, my answers might be different." Again, the espoused beliefs (on Schein's second level of culture) can be aspirational ideals, rather than primary guides of behavior.

Role-dependent: "Some of the questions would have had different answers depending on the 'hat' I would imagine a faculty member wearing (i.e. undergraduate teaching responsibility vs. graduate teaching responsibility vs. research role…)." This observation points to the possibility of sub-cultures within an institution, between which an individual might navigate. Educational change initiatives would similarly encounter these sub-cultures, e.g., "research culture" vs. "teaching culture."

V. FUTURE WORK

Future work includes broader dissemination of our survey to build a larger dataset from a diverse group of educators and institutions. We plan to specifically target teams of collaborators, in order to more closely examine the alignment and misalignment within teams involved in a change effort, alignment or misalighment between those individuals and their institution, and the impact of those group and institutional dynamics on the change process.

Additionally, this study will include follow-up interviews with select survey respondents to contextualize the quantitative data with narratives and further explanation. It will also include an action-research component, as we follow several multi-institutional collaborative educational change projects. These projects were selected based on their collective range of models for change, and their potential to contribute to broadly applicable understanding of educational change approaches.

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