I Want to Try That Too! Development of a Conceptual Framework for Interventions that Encourage Pedagogical Risk-Taking Among Faculty

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WIP: I Want to Try That Too!: Guiding Principles for Interventions That Encourage Pedagogical Risk-Taking Among Faculty

Introduction

The Polytechnic School at Arizona State University became one of six U.S. engineering schools to receive the first National Science Foundation-funded "Revolutionizing Engineering Departments" (RED) grants in 2015. The NSF RED program calls for significant and sustainable improvement in the preparation of engineers (NSF, 2014). The RED project at ASU, entitled, "Instigating a Revolution of Additive Innovation: An Education Ecosystem of Making and Risk-Taking" (EEC-1519339), is answering this call by empowering faculty to realize a mindset of pedagogical risk-taking and additive innovation (Jordan & Lande, 2016) in their classrooms. The ASU Polytechnic School has a well-established track record of innovativeness in teaching. The National Academy of Engineering (2012) recognized its engineering program as one of 29 exemplars to address real-world, industry-focused problem solving, and the U.S. News & World Report recently named ASU (for the second time) as the most innovative university in the country (Smith-Barrow, 2016). Still, faculty have been slow to embrace risk taking in pedagogical approaches beyond the project-based engineering design spine. The project therefore focuses on propagating an entrepreneurial culture throughout the program, and particularly in our mezzanine level courses that have been traditionally taught using teacher-centered methods such as lectures.

The ASU RED team is comprised of eight faculty members within The Polytechnic School engineering program. Now in the second year of this five-year project, the team is taking a multi-pronged approach toward achieving its objective, including understanding the program's current culture through experience-based narrative research, developing an instrument to assess changes in pedagogical risk-taking, studying the characteristics of making-related activities in the classroom, and tracing the impact of this RED project on other institutions (McKenna, Kellam, Lande, Brunhaver, Jordan, Bekki, Carberry, & London, 2016). Early efforts to engage program faculty in RED-related activities and discussions highlighted the need for both a subgroup and a framework to develop and implement ways to engage faculty. This work-in-progress paper reports on the research-based guiding principles that the ASU NEXUS research thread within the ASU RED project has adopted and describes the faculty-led affinity groups that have been designed and implemented using these guiding principles.

Literature Review and Development of Guiding Principles

The purpose of the NEXUS research thread is to develop faculty interventions that influence the behaviors and mindsets of faculty members related to their undergraduate teaching practices. In concert with ideas from Bolman and Deal (1991) and Borrego and Henderson (2014), we intend for the suite of interventions to consider change through multiple lenses and to employ multiple change strategies. To help ensure this, the following set of guiding principles was developed to evaluate potential NEXUS interventions:

- Based on faculty-driven (vs. administration-driven) ideas
- Community (versus individually focused)

- Sustained in duration (i.e., no one-off workshops)
- Flexible for faculty to modify and adapt
- Inclusive of opportunities for feedback and evaluation on the intervention itself
- Connected to faculty motivators of autonomy, community, recognition, and efficacy
- Connected to faculty values linked to motivation (perceived as important, of low negative consequence, enjoyable, and beneficial)
- Disruptive to current thinking and practices but simple to implement

These guiding principles are grounded in literature on educational change, motivation, organizational studies, and STEM teaching practice. Borrego and Henderson (2014), for example, provide a review of the effectiveness of a number of STEM education change strategies. They organize their review around the model put forth by Henderson, Beach, and Finkelstein (2011), which organizes change strategies based on: 1) whether the desired change is predetermined or emergent and 2) whether the scope of the change is intended to impact an individual or an entire organizational structure.

A number of findings from Borrego & Henderson (2014) were of particular relevance to the development of the RED NEXUS project's guiding principles. First, they highlight that efforts aimed at changing culture should avoid a top-down approach (e.g., that all faculty are expected to try new pedagogies in the classroom in order to receive positive annual evaluations) and should instead be emergent (e.g., faculty arrive at the idea of trying new pedagogical approaches on their own). Second, they cite previous work illustrating that sustained change efforts are significantly more effective than single, stand-alone workshops. Furthermore, the article highlights that more successful interventions allow participants (i.e., faculty) both to adapt and modify proposed strategies to their own contexts and to provide feedback and suggest modifications to the strategies.

The guiding principles also include ideas drawn from literature on faculty motivation, acknowledging that faculty are more likely to participate in change strategies when they are motivated to do so. Wergin (2001) calls out four specific motives for faculty: autonomy, community, recognition, and efficacy. By this model, faculty are more likely to be motivated by work that allows them to investigate problems of interest to them, aligns them with a community of other scholars, provides them with opportunities for acknowledgement for their work, and gives them a sense of making a positive impact. Expectancy-value theory (EVT) (Eccles, et al., 1983) has also previously been used to study faculty motivations (Finelli, et al., 2013; Matusovich, et. al., 2014). Per EVT, the perceived importance, enjoyment, benefit, and consequences of engaging in a task, are related to the motivation to engage in that task (e.g., using a particular pedagogical approach).

These guiding principles also align with Furco and Moely's (2012) conditions that help ensure faculty support and buy-in of interventions: 1) the goals of the intervention must align with faculty's values and be communicated clearly to faculty, 2) faculty must have opportunities to engage with and learn about the intervention without it taking too much time, 3) faculty must perceive institutional support for the intervention, and 4) faculty must be rewarded for engagement with the intervention, rewards could be personal (e.g., an individual faculty member's professional development) or institutional (e.g., formal recognition in annual reviews).

By these conditions, faculty are more likely to support and buy into proposed NEXUS interventions when the faculty understand the goals of the intervention, when the intervention aligns with their values, when the faculty feel that they are rewarded for engaging in the interventions, and when the faculty feel that the larger institution supports them as they are trying new approaches to their teaching.

Finally, one of the broader goals of the ASU RED project is to encourage faculty to adopt a risk-taking mindset in their teaching and research to encourage broader changes to the institutional culture. In organizational literature, Neves and Eisenberger explore the role of perceived organizational support and how that support impacts employee's likelihood to take risks in their positions (2014). Neves and Eisenberger found that perceived organizational support was linked positively to failure-related trust and thus to the likelihood of taking risks by employees. This literature supports the idea that through having institutional support for interventions that may not be successful, we are more likely to empower our faculty to propose interventions that are disruptive to current thinking and practices.

Example Application of the Guiding Principles: NEXUS Faculty Affinity Groups

Prior to the start of each academic year, The Polytechnic School holds a staff/faculty retreat to build community, review progress and upcoming goals, and engage faculty in any necessary program preparations. For the retreat prior to the fall 2016 semester, we used the guiding principles to structure engagement and conversation with the engineering program faculty. In order to focus on faculty-driven ideas we structured a 90-minute session where faculty were asked to identify any challenges or interest areas they have with any aspect of the engineering curriculum. Consistent with the guiding principle of building community, the overarching goal was to allow for faculty to share ideas such that affinity groups could emerge grounded in what was of interest to faculty.

After a quick warmup exercise, the RED team asked faculty to break up into smaller groups and brainstorm pain points they faced and how they can begin to address them. This was done in an unconference (Pawley et al., 2015) style, where faculty generated topics and were instructed to move among discussions as they saw fit. This exercise was repeated twice, each for 30 minutes. Faculty converged into several groups: aligning the project courses, advancing the manufacturing curriculum, ensuring proficiency and excitement in math intensive classes, building progressive technical competencies throughout the curriculum, and ensuring quality at scale. The level of engagement and lively nature of the discussions suggested that faculty were very motivated by these topics, which is an important element in the guiding principles.

The topics that emerged from the retreat were a starting point for creating sustained activity around areas of affinity. After the retreat, faculty were invited to join one of these existing groups for sustained engagement, switch to a different group, or propose a new group. From this exercise, four affinity groups evolved:

a. Project Spine Courses: How to align student outcomes
b. Revolutionizing Math Intensive Courses
c. Revolutionizing Content Heavy Courses Through Flipping – How to make it work

d. Rethinking How We Teach Our Students To Communicate In Writing

To formalize the groups, each affinity group completed an online intake form documenting their goals, the potential classes impacted by their group, and any resources needed to achieve their goals. To provide recognition, and to acknowledge the commitment to advancing a curricular innovation, we designated all faculty participants as a "RED Poly Faculty Fellow." Depending on the group's resource needs, the RED team and grant will serve as a resource. We are in the early stages of the group activity, but we recognize that each team has different needs. As part of our NEXUS research, we will document the different needs, how they are resourced, and what might be necessary from a structural perspective to enable this type of affinity grouping to persist from an organizational change point of view.

In an attempt to further demonstrate institutional support for the affinity groups, time will be provided at the end of monthly engineering faculty meetings for affinity groups to provide updates to the broader engineering faculty and to meet with their teams. Our hope is that this time will provide visibility for the affinity groups, minimize scheduling conflicts for teams to meet, and help catalyze change in other faculty members—possibly through encouraging them to innovate and take pedagogical risks.

At the end of the first year, each affinity group will have an option to renew the support from the RED team for another year, while committing to continue to work together in making an impact in an area of common interest.

Though the RED team promotes the formation of the affinity groups and some members of the larger RED team are also members of the affinity groups, the success of the affinity group lies solely on the level of interest and participation of its members. It is expected that some groups will be more functional than others, while some groups may fade away naturally. Outside of interest and participation, other factors that could play a role in the persistence of these groups include personality differences among faculty members or philosophical differences in strategic approaches. To help ensure the success of the affinity groups, a graduate student has been designated as a project manager to help ensure the groups are making progress on their goals, serve as a liaison between the affinity groups and the larger RED team, and assist with scheduling meetings.

This example of the affinity groups was provided to illustrate how we used the guiding principles to develop an intervention. Table 1 explicitly shows how the affinity groups aligned with the guiding principles that are theoretically framed in the literature.

Next Steps and Future Work

We have organized our efforts through an informed set of guiding principles to help scale and sustain the positive impact of these faculty affinity groups in support of our larger research project goals. We have started to support collective faculty action to discuss and act upon areas of shared concern for teaching issues. As part of a larger project to affect risk-taking and encourage pedagogical change within our engineering program faculty, the RED team is encouraged by the engagement and interest of our peer faculty so far. Our first cohort of affinity

groups is working through this spring semester and will share initial results, findings, and next steps at the end of the term. Details of these affinity groups' evolution are being documented, through the field notes of participant-observers on the teams (members of the RED team who are also members of the affinity groups). We hope to evaluate the efficacy of our approach and the utility of our set of guiding principles, in service to fostering future cycles of affinity groups. By reflecting on what worked and what could be improved, this set of faculty-led NEXUS interventions could model how to affect real and substantive faculty change.

Table 1. Mapping of guiding principles to NEXUS affinity group activity.

Guiding Principles	Attributes of Affinity Groups that Align with Guiding Principles
Based on faculty-driven ideas	Formed organically during a faculty retreat and based on faculty interests and pain points
Community-focused	Groups of faculty are working together in areas of common interest to support each other as they attempt to make changes to their individual teaching or to the broader engineering curriculum
Sustained in duration	Affinity groups meet regularly (including during faculty meetings)
Flexible for faculty to modify and adapt	Affinity groups have autonomy and can change directions as they see fit
Inclusive of opportunities for feedback and evaluation on the intervention itself	Affinity groups are encouraged to evaluate their interventions, either through peer observation techniques or through using the RED evaluation team
Connected to faculty motivators of autonomy, community, recognition, and efficacy	Affinity groups align with faculty motivators as they encourage autonomy, are inherently community-based, and build in recognition through updates at faculty meetings and RED Poly Faculty Fellows distinction.
Connected to faculty values linked to motivation (perceived as important, of low negative consequence, enjoyable, and beneficial)	Affinity groups were designed to align to faculty values by focusing on important to faculty and providing resources so that changes to teaching and curricula can be realized with minimal effort
Disruptive to current thinking and practices but simple to implement	Affinity groups are encouraged to play with ideas and take risks. The RED team is supportive and encouraging of out-of-the-box ideas that the affinity groups come up with

Acknowledgements

We would like to acknowledge the other ASU RED team members, Adam Carberry, Shawn Jordan, and Jeremi London, for their engagement on this broader project. Moreover, we would like to thank for their participation the faculty at ASU who are members of the affinity groups. Finally, we thank the The Polytechnic School at ASU and the evaluation team for supporting data collection and participation in this research. This work is supported by the National Science Foundation Grant 1519339. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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