Board 121: Lessons Learned: Mapping and Mobilizing Faculty Assets for Creating Faculty-Development Programs in Engineering Ethics Education

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Abstract

The lessons-learned paper documents our ongoing project to create faculty development programs in engineering ethics, with an eye to sharing insights that may be transferable to other types of faculty development. To provide background for our project, the College of Engineering at Penn State University has an endowment having the goal of developing faculty competencies to integrate ethics into the engineering curriculum and assess student learning of ethics. Since the university and the College of Engineering are considerably large, comprised of many units with stakeholders in engineering ethics— including various departments, institutes, centers, and programs—getting to know our faculty, surveying their existing efforts, and identifying interest groups are foundational to the success of our faculty development programs. In the process, we referenced the asset-based community development (ABCD) approach [1, 2] and adapted it to our mission of faculty development.

This paper discusses the opportunities presented by the ABCD approach for faculty development. Even though we are still in the planning stage of faculty program development and only begun an initial step, we found that the ABCD approach's focus on faculty assets and community development provides lessons learned for our initial plan to advance engineering ethics education. While our experience of faculty development is situated in engineering ethics and future work remains to be done to assess the impact of our projects, we suggest the ABCD approach may be applicable to other types of faculty development programs where knowledge, skills, experience, or professional interests play an important role.

Background

This lessons-learned paper presents an ongoing initiative to create faculty development programs in engineering ethics. To provide specific contexts for this work-in-progress and the roles we play, the College of Engineering at Penn State University has access to a special endowment having the goal of developing faculty competencies to integrate ethics into the engineering curriculum and assess student learning of ethics. The endowment provides financial resources that help establish a postdoc position hosted currently in the College's Leonhard Center for Enhancement of Engineering Education to meet the goal. The lead author was hired for the postdoc position and began his work in September 2023, and the second author is the director of the Leonhard Center. The director meets weekly with the lead author to provide connections, guidance, and other resources to facilitate his work and professional development. Since the two authors work closely, the following text opts for the first-person plural point of view, or "we," to collectively describe works any of us have done.

The Asset-based Approach to Faculty Development

We hold the view that faculty possess a distributed inventory of knowledge, skills, experience, and professional interests that any faculty development programs would need to identify and build upon. We call this often-intangible wealth of what faculty collectively possess "assets," and an asset-based approach pertains to a faculty-development philosophy that does not see these assets as deficit or need to be filled by a new initiative, but instead strengths and resources that our faculty development programs should draw on and engage with. Whereas asset-based approaches (e.g., [1]) and other seminal concepts or pedagogue—such as funds of knowledge [3, 4, 5], culturally relevant pedagogy [6], culturally responsive teaching [7], and community cultural wealth [8]—have long recognized and advocated the skills, knowledge, identities, and cultures of adults and children belonging to underserved, disadvantaged populations in the context of community development and pre-college education, we explore the assets of faculty for instructional development in higher education from faculty developers' perspectives.

But why asset-based approaches? In general, the literature has identified opportunities for engineering faculty to learn more effective ways to teach, partially because there have not been sufficient training or incentives to prepare engineering professors for teaching [9, 10] and partially due to growing expectations from engineering education [11, 12]. In the case of engineering ethics education, however, instruction is highly dependent on what an instructor authentically believes and enacts from the perspectives of their training, experience, and knowledge situated in a particular discipline and "engineering culture" (e.g., [13]), which is unlike delivering traditional technical topics. For example, while privacy and data security are important ethical considerations in software engineering, they are not an issue that a civil, mechanical, or chemical engineer would regularly encounter in their practice. Ethics case studies, ideally, draw on recent events and classic examples, and what are meaningful to an instructor and their field may not be applicable to other fields. Ethics materials and pedagogies, furthermore, depend on course levels, the student audience, and faculty's additional knowledge of the liberal arts, including familiarity with the humanities literature, ability to teach critical thinking, and ability to lead classroom discussions. The diverse contexts of teaching ethics, in addition to the variation of faculty knowledge and experience, have contributed to differing

opinions among faculty about “exemplars” of ethics education (e.g., [14]), making “best practices” unlikely to emerge and transfer.

In this respect, surveying the landscape of faculty assets is crucial to creating faculty development programs in engineering ethics, considering that our university has more than 20 degree-granting engineering programs (including ones hosted outside the College of Engineering) and that the College of Engineering has three centers that can provide resources related to engineering ethics (broadly construed to also include equity and cultural sensitivity) and one minor program that offers courses on ethics and equity specifically for aspiring engineers. As a first step, getting to know our faculty and existing efforts in engineering ethics, surveying their knowledge and experience related to ethics, and identifying special interest groups are all foundational to the success of our faculty development programs. The rest of our paper documents the work we have done so far and our plans for future faculty development programs.

During the planning stage, we referenced the asset-based community development (ABCD) approach and adapted it to our mission of faculty development. The ABCD approach was pioneered by Kretzmann and McKnight [1] to challenge the paradigm of public services programs that were deficiency- and needs-oriented. Seeing that the private service industries had constructed customer needs and “deficiencies” to expand its client base and market, McKnight [15] became critical of a similar tendency in public services to want more clients and create more need-based services, and hence, dependency of a welfare recipient. His response was to replace the deficiency-based model with a strategy that identifies and employs an inventory of capacities, skills, and resources from the local community for its grassroot development and revitalization [16]. Shifting the former framework to university development and leadership, Biscotte and Mouchrek [2] adapted the ABCD approach to build a community of faculty, staff, and administration to reform their university’s general education curriculum. With permission, we reproduce an illustration from Biscotte and Mouchrek [2, Fig. 1] showing in details the steps and actions involved in their framework.

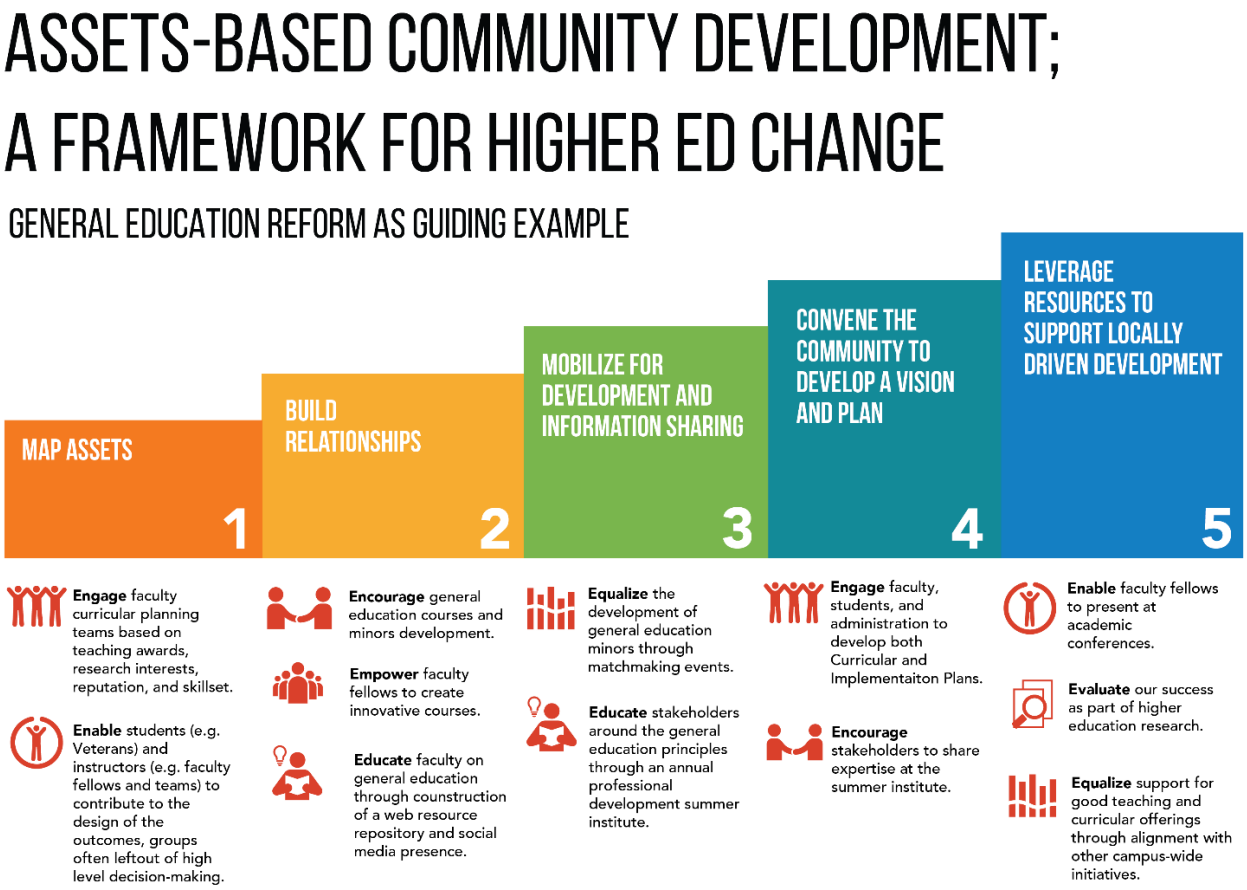

Figure 1: 5-Step ABCD model developed by Kretzmann and McKnight [1], expanded on and mapped to general education reform by Stephen Biscotte. Design: Najla Mouchrek. Reproduced with permission.

Lessons Learned: Applying the ABCD Approach in Our Planning

In our case of creating faculty development programs in engineering ethics, one initial goal before we referred to the ABCD approach was to help individual faculty develop competency in teaching engineering ethics in one's classroom. We wanted to survey our faculty's strengths and weaknesses to know what they already do well and what remains to be improved. Knowing their "prior knowledge" would help us create workshops and other events to address common inadequacies and avoid "preaching" about what most faculty already know. Compared to the ABCD approach, this original goal turned out to be limited in three ways. First, since the initial plan was to hold workshops addressing remaining weaknesses after considering what faculty already know, its vision was apparently confined to the deficit model and did not recognize or validate the assets in the community. The ABCD approach allows us to see prior knowledge not as preconception or a background but something we can engage with and build upon (Step 1).

Second, engineering ethics is unlike traditional engineering sciences (e.g., thermodynamics) that appear (more or less) universal and time-invariant. There have never been "best" pedagogies or course materials in engineering ethics. As discussed earlier, instruction highly depends on faculty's disciplinary knowledge, academic/industry experience, and professional interests. Instead of thinking we would develop singular "competency" among faculty, we realized that there must be plural "competencies" and multiple pathways for faculty growth. Also, after meeting informally with several faculty members who teach engineering ethics in some capacity (i.e. teaching ethics for at least a part of a course if not teaching a standalone ethics course), we realized all of them already have accumulated a combination of teaching, research, and industry experience in some area of engineering ethics, such as conflicts of interests, inclusive design, sustainability, equity, or privacy. Moreover, some engineering faculty we talked to are already experts of ethics in their specialized fields, such as bioengineering ethics. From the perspective of the ABCD approach, they are not "smart students" in a faculty development program; they have the capacity to facilitate other similar faculty's instructional development. It implies that our role in a faculty development program is not only a facilitator, but may also be a facilitator of facilitators.

Third, the ABCD approach has a specific focus on the community. Compared to our initial plan to create workshops to teach faculty something they may not know, the ABCD approach's potential for a faculty development program is to build relations between participants (Step 2) and mobilize a community of faculty (Step 3) who have hitherto been solitarily engaging in engineering ethics in their academic compartments. Ideally, the ABCD approach suggests that once the community is functioning, as facilitators we may convene faculty to develop a longer-term collective goal for engineering ethics education (Step 4). Eventually, once we have a clear vision for what we would like to do as a community, we may begin leveraging outside (or off-campus) resources to sustain locally driven development (Step 5), such as funding from agencies like the NSF or feedback from giving a talk in an engineering education conference. However, more realistically, we think Step 5 could have happened at any point between Step 2 and Step 4, because faculty are expected to work autonomously and many of them are able to acquire resources. Our role, instead, is to help them identify appropriate venues and inform them about the process, for example, by orienting them to the expectations of an engineering ethics conference or journal.

Our Present Work

At the time of writing, we have only begun Step 1 of the ABCD approach. When surveying faculty assets, we consider faculty in our university instead of limiting them to the College of Engineering because some engineering programs are offered in other colleges. We also recognize that other colleges have faculty who carry out research or have experience relevant to engineering ethics from the perspectives of history, sociology, political science, law, data and information sciences, business, etc. In the long run, it would be desirable to recognize their expertise when mapping faculty assets in engineering ethics.

Because our faculty development programs focus on instructional development (instead of, say, professional development for research), an initial effective strategy to survey faculty assets in engineering ethics education is through each engineering program's accreditation document for

the Accreditation Board for Engineering and Technology (ABET), known technically as the Self-Study Report. Since ABET requires an accredited engineering program to demonstrate in the Self-Study Report how they have met a prescribed set of student learning outcomes, knowing courses whose learning outcomes and assessment have been shown to meet ABET ethics-related criteria would allow us to identify faculty who have taught ethics-related courses. We can then research on what is publicly available about these faculty and their assets before we formally approach them, if needed, to fill in more details pertinent to our faculty development projects.

Last December (2023), through one of the College of Engineering's assistant deans, we were introduced to our university's ABET Coordinators, gave a talk about our project on faculty assets in engineering ethics, and requested comments on our works. This January (2024), we were granted access to each engineering program's Self-Study Report, which, we should note, is confidential to each department and the university's authorized personnel. While we just began analyzing these reports and identifying faculty assets, to lay the groundwork for next steps in the ABCD approach, we expect that in this process we will also compile a list of exemplary cases in engineering ethics education and carry out a broad assessment and analysis of the university's engineering ethics education (as reflected in the Self-Study Reports). We expect these will help us plan for workshops where faculty may meet and exchange their experience (Step 2 and 3), work on common goals (Step 4 and 5), and develop a community and several special interest groups (Step 3, 4 and 5).

Final Remarks

In the literature of faculty development, we found that considerations of diverse teaching settings and faculty identities are less discussed than other concepts or strategies (e.g., [12]). Even though similar concepts like teacher autonomy have been systematically investigated and discussed in other educational fields like language education (e.g., [17, 18]), faculty-development philosophy that stresses the autonomy and individuality of faculty remains underexplored in engineering education (with rare exceptions like [19]). While we are still in the planning stage of our faculty development programs and only began the initial step of the ABCD process, we intend to introduce the ABCD approach, discuss what we learned from the approach in our initial plan, and call more attention to faculty assets and the concept and approach's potential. Even though our work of faculty development is situated in engineering ethics and future work remains to be done to assess the impact of our projects, the ABCD approach is likely applicable to other types of faculty development programs where knowledge, skills, experience, and professional interests of faculty play an important role.

Acknowledgements

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