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PreService Faculty Teaching and Epistemological Beliefs: a Phenomenological Inquiry

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Research WIP: PreService Faculty Teaching and Epistemological Beliefs: a Phenomenological Inquiry

Introduction

This is a research paper presenting our work with faculty-to-be. Engineering faculty are often not trained pedagogically [1], [2], [3] prior to their entry to the professoriate. Given their rigorous preparation through apprenticeship-model programs for research skill development, these faculty-to-be are well prepared for research. However, there is not a similar degree of preparation for their pedagogical skills. Given the wide array of difficult skills involved with adult education, this is cause for concern. There is significant research on efforts to facilitate this pedagogical capacity with faculty, yet the problem has persisted.

One method which has remained under-explored is preparing faculty before the multiple pressures of the academic positions, or when they are still in graduate school. The presumption of most programs currently is that the experiences being a Teaching Assistant (TA) will effectively prepare them for their future academic careers as educators. This is unfortunately well documented to not be the case [4], [5], [6], [7], [8]. Most TA preparation programs are cursory [9], focused on classroom facilitation or grading procedures [10], and rarely cover the full scope of responsibilities [11] for developing, delivering, or designing a course.

Unfortunately, there is also a lack of foundational knowledge about the pedagogical instincts or views towards teaching of this population. Effective educational design relies upon formative assessments, and in this case there is insufficient knowledge of the current views and beliefs of future faculty.

Methods

We interviewed several PreService (PSF) faculty, which is a term we coined to describe (engineering) graduate students intent on pursuing a faculty position after acquiring their degree. PSF were recruited via university listserv emails, and then interviewed in-person or via Zoom, at their preference. We asked them about their views on teaching, how that would be facilitated, and how that interacted with their own learning. As such, this study seeks to understand how PSF consider “effectively teaching engineering” to occur.

This data was collected under a semistructured interview protocol [12], [13] built around the assumption that ideas about learning and teaching are interrelated [14], [15], [16], [17], [18]. The protocol was developed to elicit core learning experiences of our participants and their view of good teaching. The protocol also inquired about those core learning experiences in targeted ways to help the participants explicate elements of their epistemology. We asked questions about specific experiences with follow-up questions to better understand what made those experiences (un)helpful for their learning. We also asked focused questions to determine what made those core experiences so memorable. The participants were also asked to imagine themselves teaching within an academic setting, considering both logistics and course design decisions.

Participant demographics are shown below in table 1 organized by their self-selected pseudonym. Though identity is not a significant focus of our work, it is an integral contextual element which informs all life experiences; participants were asked if there was anything additional about their identity they felt was important to convey and share.

Table 1: PSF Participant Demographics

PSF	Gender	Year	Major	Industry Experience	Teaching	Ethnicity	Other facets
Red	M	2	Chemical	N	Expecting to TA	White	
Scott	M	1	Industrial	N	no	White	LGBTQ
Bob	M	5	Computer	Y	Solo and TA	Asian	
Deepika	M	3	Chemical	N	TA	Asian/indian	Low SES
Jeanne	F	5	Industrial	N	Solo and TA, adjunct	White	LGBTQ, 1st gen, low SocioEconomic Status
Alex	M	3	Industrial	Y	Solo and TA	Asian	
Janelle	F	4	Chemical	N	TA	Asian	
Morgan	F	4	Biomedical	Y	TA	White	
Jeff	M	1	Biomedical	N	No	Asian	
Faye	F	4	Mechanical	Y	No	White	

A phenomenological analysis was performed with the dataset, honing in on the components of the interview which relate to epistemological views of the participating PSF [12], [19], [20], [21]. Within this analysis process, we chose to align to Giorgi's process for descriptive phenomenology, as it was the most detailed and rigorous method we identified. Further, given the method's development within analytic psychology, this method balances the well-structured nature of STEM with the intuitive and adaptive methods inherent to qualitative research, and especially within phenomenology.

Giorgi's method follows general protocols of phenomenology and is presented below [21], [22], [23], [24], [25].

A. Listen to each interview repeatedly.

B. Identify key elements or codes within the interview.

C. Only use the participant's words to define those codes.

D. Determine the organizations of those codes, or themes for the interview.

E. Organize the themes within a hierarchy for the phenomenon

F. Repeat this process for every interview, independent of other interviews.

G. Look across all the interviews for consistent themes and hierarchical relations.

H. Determine which of those themes and relations are most important and essential to the phenomenon.

I. Develop the composite phenomenon via those essential themes and relationships. This should take the form of a hierarchy of themes.

This analysis was conducted for each participant individually, then comparing those individual phenomenon structures to develop a composite hierarchy of consistent themes for the entire population.

Findings

Our work looks at the beliefs of PSF, namely answering the questions

What do PSF consider to be "effectively teaching engineering?"

How does the phenomenon's structure reveal portions of their epistemological beliefs?

Our analysis revealed PSF had unexpected perceptions about the role of the instructor. Most of our participants noted the powerful, yet limited, autonomy of the instructor. PSF also made an interesting distinction between the course viewpoint and the classroom viewpoint. They considered course design and curricular decisions which the instructor made with one lens, and the interactional decision-making done in the moment during the course of a class session from a different lens. Given the limited training in pedagogical development of most of our PSF, this was both surprising and heartening.

Effective teaching depends on the framing

PSF had interesting distinctions in what they described as 'effective teaching' most notably the distinction between classroom setting facilitation and the overall course design structure. Within the classroom setting, there was significant autonomy, while within the curricular design, there was extremely limited autonomy. This makes sense, but was an interesting distinction that they drew. The other distinction drawn was who held the primary responsibility for motivation. The

classroom setting where the learning occurred was the responsibility of the student to stay motivated, while during the content coverage it is the instructor's job to motivate students to stay engaged and make it through the content.

Classroom Structure

Within the classroom structure, PSF beliefs were extremely student-centered. The primary goal was facilitating student learning through selected methods of pedagogy. This was leveraged through components such as: projects (specifically group work), student motivation, the usage of multiple teaching methods, and methodological iterations on those methods.

Red has an interesting take on this, asserting that "teaching is like a strong dictatorship, but where you listen to the voices of the people you're ruling over. You have to like understand the needs of the people that you're controlling and you have to meet those needs." Red later elaborates that "I need to have unconditional power in the classroom but at the same time, I have to use that to try to help foster their learning, that's my role." So he believes he needs to have full control of the classroom environment so that he can accomplish his responsibility of facilitating the student's learning. Alex has a different way to state the same outcome, asserting that the role of the instructor is to "One, it would be like making sure everyone is interested. Okay, because there might be some people who have different tastes. yeah I will try to make my class interesting to everyone, second, I will try to make my class interactive as interactive as possible" all so students are engaged and thus learning.

Jeanne, similarly, states that "I think that in a classroom you should have opportunities for all of that you know find something that works for each student, I think that everyone is capable of learning it's just you know getting the information to them and. I don't know, I think it should be more about student progress so providing them. With feedback, not in the sense of 'Oh, this is wrong', but. 'hey you did this really well here's what we should improve on and work on'." Here Jeanne is asserting that a classroom should be opportunities for students to learn, and the instructor should work to 'get the information to them.' However she is also emphasizing the role of feedback from assessments for students, positioning it as a learning tool rather than a grading technique.

Course Structure

Within the course design overall, there was a significant distinction, with most beliefs PSF held being teacher-centered. The primary focus of these beliefs were the coverage of necessary content or concepts. This was facilitated through curriculum connections, relating to real-world situated nature of those concepts, and the need to cover specific content, much of which was dictated by external parties. Those necessary content would ideally leverage student interest and facilitate their engagement, but those were secondary to actually covering the material. As Scott puts it, "I think for teachers job is to actually teach topics, but also to expose students to new areas that students might not have been familiar with." Here Scott is emphasizing that a teacher's role is to teach topics, but also to teach students new areas that are related to those topics.

Deepika states that what a teacher covers in a course "depends on the university's rules that they might have. They might say you have to teach entire material from like Chapter one chapter 10

to other students… So hopefully whichever university I go to I'll have the freedom to be able to decide, you know how I'm going to teach the students, what I'm going to teach the students."

Faye also says that her "first time teaching a class on my own I'd probably just take it and do it how they'd always done it and learn from my experience for next time. I don't think I would just go in and change everything that I want, I think you have to understand your situation and your problem before you can make changes." Here Faye is emphasizing that she can't change a course she is teaching without understanding why the current form exists.

Drawing together the parts

We can see from our data that PSF have beliefs about teaching that are much more student-centered than expected; this aligns with beliefs of new faculty, which emphasizes that there is some clear disconnect between beliefs or intentions and enacted pedagogical practices. Faculty instructional practices are more often necessitated by time and research constraints, as opposed to the more time intensive, student-centered educational practices [26], [27], [28], [29], [30], [31], [32], [33]. It is fascinating to see that many of these student-centered teaching beliefs have already coalesced and emerged within the PSF, despite their stage of graduate school. This is an exciting avenue of continued exploration, to determine where and why this disconnect between beliefs and enacted practices, and how we can equip future faculty to better navigate the transition to enacting the teaching methods which align to their beliefs. We can see how PSF are primed with student-centered ideas, ready for activation through pedagogical training; many of these PSF would likely respond very positively to workshops such as those designed for faculty development or facilitated by a center for teaching and learning. PSF have the beliefs about student-centered teaching, but not the vocabulary, ideas, skills, or clear enactment plans for those beliefs. Future lines of work could facilitate training with PSF and examine whether this adjusts their teaching methods, as well as considering how to provide PSF with structured and scaffolded teaching settings, such as apprenticeships, to develop these pedagogical competencies within realistic classroom contexts.

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