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Understanding the Perspectives of Empathy Among Engineering Faculty Members

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Understanding the perspectives of empathy among engineering faculty members

Abstract

In higher education, studies have shown that teacher empathy can lead to better student learning outcomes, diverse and inclusive learning environments, as well as less teacher burnout. In engineering education, research on empathy has recently gained significant interest and most of this research is focused on developing and fostering empathy among engineering students. Teacher empathy is a relatively new direction yet to be taken in engineering education. In this study, we are interested in developing a preliminary understanding of the views about teacher empathy among engineering faculty. The research question that guides this work is, how do engineering faculty members define, understand, and value teacher empathy? We used the Model of Empathy Framework [1] as a lens to understand the perspectives of the faculty members. While the framework is developed specifically to understand various attributes of empathy among engineers and engineering students, we used this framework to better understand empathy among engineering educators. The framework is made up of three mutually dependent dimensions: skills, orientation, and being. The skills dimension includes empathic skills that can be learned such as perspective taking, mode switching, and affective sharing. The orientation dimension concerns one's proclivity for being empathetic and includes aspects such as an epistemological openness and reflective values awareness. The being dimension aligns with one's values and morals as engineers and citizens and how these morals and values define and guide our actions and behaviors. Interviews were conducted with three assistant professors and one professor and these interview transcripts were thematically analyzed using in-vivo, concept, and thematic codes. The Model of Empathy Framework informed the development of concept and thematic codes. Participants demonstrated attributes of the skills and orientation dimensions of empathy when expressing their views on teacher empathy. This pilot study demonstrates the usefulness of the Model of Empathy Framework for engineering educators, while also showing some preliminary understandings of how engineering educators define, understand, and value teacher empathy.

Introduction

Teacher empathy is a term used to refer to the empathic behaviors of teachers towards their students. In specific, Meyers et al. define teacher empathy as "the degree to which instructors work to deeply understand students' personal and social situations, feel caring and concern in response to students' positive and negative emotions, and communicate their understanding and caring to students through their behavior" [2, p. 161]. Through research focused on higher education and K-12 education we have a baseline understanding about teacher empathy in general and how teacher empathy contributes to the overall learning experience of students and their academic performance [3]–[6]. Both the students' perspectives [3], [5]–[10] and teachers' perspectives [11]–[18] capture the importance and benefits of teacher empathy towards student-teacher interactions and conducive learning environments. There is very little research that explicitly explores the concept of empathy in engineering and engineering education let alone teacher empathy.

In engineering education, though the concept of empathy is implicitly present in engineering through human-centered design and user design [19], active use of empathy as a skill to connect

with customers is not commonplace in engineering "as these terms traditionally do not mesh with the dominant image of engineering" [20, p. 2]. Much of the research on empathy and its related terminology [20] is focused on teaching empathy to students and how students become more empathetic [21]–[23]. For example, Walther et al. [21] introduced empathy modules in an undergraduate mechanical course to practice empathy as a skill and provided results of the sensitive nature and complexity of teaching empathy.

While most of the research in engineering education is directed towards teaching empathy as a skill, Astin [24] conducted a comprehensive study to understand how the college experience affects students and, in particular, how faculty characteristics affect the experience of students. The study included 34 measures related to faculty characteristics, including type of teaching methods, level of altruism, values, morals, and student orientation. Astin found that high research orientation of faculty members had negative impact on student satisfaction. He found that the student orientation of faculty members had a number of positive effects on academic outcomes such as degree attainment, self-reported growth in writing skills, critical thinking abilities, analytical and problem-solving skills, preparation for graduate school and overall academic development. Among the 34 measures that were used in his study, the role of empathy was very limited and was studied as an implicit concept in some of the items within the "student orientation of faculty" construct. The numerous benefits of teacher empathy mentioned in higher education and the scarce amount of research on teacher empathy within engineering education is one of the underlying motivations for conducting this study. More importantly, teacher empathy has been demonstrated to contribute to the overall learning experience and academic performance of K-12 and higher education students and a deeper understanding of teacher empathy that can be used to inform professional development efforts may lead to improved teaching and learning within engineering education.

The main purpose of this qualitative pilot study is to understand engineering educators' perspectives about teacher empathy in an engineering classroom setting. The findings from this study will help to set a research agenda in engineering education focused on teacher empathy within engineering. The Model of Empathy Framework developed by Walther et. al [1] will be used to help frame this study. This framework was developed by adapting extensive studies about empathy in higher education and adapting these to the context of engineering. Specific details of the framework are provided in the following section. The main research question that guides this study is,

How do engineering faculty members define, understand, and value teacher empathy?

Conceptual Framework

Strobel et. al [19] pointed out the absence of a coherent framework that contextualizes empathy specific to engineering. Since then, a Model of Empathy Framework was formulated [1] to overcome this issue. The model was created based on "intellectual and pedagogical traditions of social work" [1, p. 124]. The role of empathy within social work and social sciences were compared with the concept of empathy within the engineering field and a framework was created. This framework provides a foundation to further understand the presence of empathy among engineers and engineering students. This empathy framework was created with the main intention to teach and practice empathy as a skill in engineering. Hence the model has various attributes of empathy that can be developed as a skillset. While it was not created with teacher

empathy specifically in mind, it appears to be a framework that is flexible and adaptable enough to apply to others including, for example, engineering faculty [1]. The model (Figure 1) is created with three dynamic and interdependent layers of empathy: the skills dimension, the orientation dimension, and the being dimension. The following sections elaborate on these three dimensions.

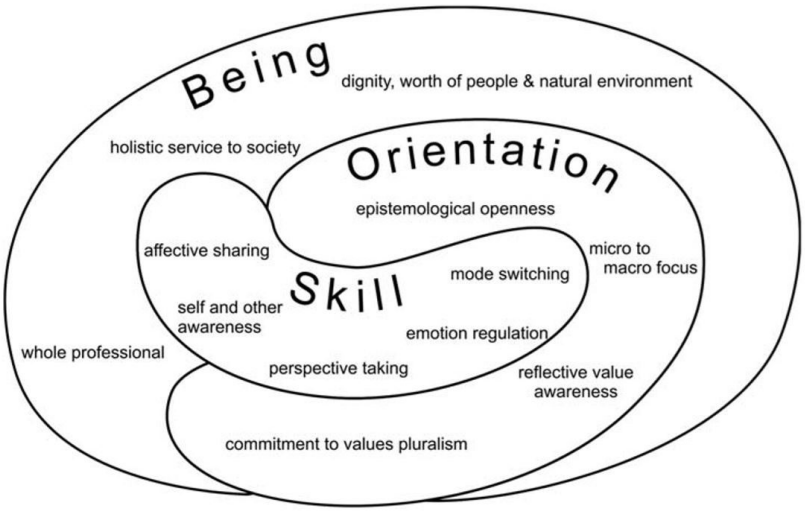

Figure 1: Model of Empathy Framework [1]

Skills Dimension: The innermost layer is the skills dimension, which provides attributes that form the base for "empathic communication, relationship building and decision making" [1, p. 133]. The five attributes that form the skill dimension are socio-cognitive in nature and are interdependent with each other. The *affective sharing* attribute is defined as "a person's capacity to share the emotions of the emotional state of the other" [1, p. 134]. The *self and other awareness* attribute builds on the affective sharing attribute and is the ability of a person to understand the subjective situation of the other without losing their own perspective. While these two attributes are implicit by nature, the *perspective taking* attribute is more explicit and is the ability of a person to adopt a more conscious step to understand the situation of the other. *Perspective taking* captures the interactions of a person to understand another person. *Emotion regulation* "describes an individual's ability to influence the ways in which they experience and express the emotions resulting from empathic interactions with others" [1, p. 134]. The fifth attribute specifically added for the engineering field is the *mode switching* attribute, which is a person's capability to effectively switch between empathetic and analytic thinking processes.

Orientation Dimension: This second interdependent dimension helps to contextualize the key factors that influence how engineers and engineering students respond empathetically. It provides the lens to view the possible reasons behind the choice of an engineer to act empathetically and capture the mental disposition of engineers. There are four main attributes within this dimension: 1) *The epistemological openness* attribute captures the inclination of an engineer to "recognize and value the subjective experiences and perspectives of others as valid and important source of knowledge" [1, p. 135]. *Epistemological openness* allows a researcher to capture the thought process behind the various actions of an engineer. 2) The second attribute is the *micro to macro focus* which informs the need for an engineer to consider the systems-level implications of their action along with the individual level implications. 3) The *reflective value*

awareness attribute covers the need for ethical and professional impact of an engineer's action. The ability to reflect on their own values and improve their internal disposition in terms of empathetic actions aligns well with the need of life-long learning skills for an engineer. 4) The fourth attribute is *values pluralism* which emphasizes the need for purposeful and transparent discourses among the various stakeholders for embracing and supporting diversity within engineering.

Being Dimension: The third interdependent dimension provides a broader value for the development of the skill and orientation of empathy within the engineering domain. Walther et al. argue that educators cannot expect their students to embody the first two dimensions "without fundamentally grappling with the contextual and deeply personal questions of what it means to be an engineer in the world" [1, p. 137]. There are three attributes that allow for effective understanding of the contextual framework of an engineer. The *service to society* attribute helps to broaden the discourse "to include a deep consideration of, and genuine service to all human and non-human stakeholders" [1, p. 138]. The *dignity, worth of people, and natural environment* attribute enables deeper understanding of the reflective values and epistemological openness concepts by providing a broader belief in the dignity and worth of all people and the natural environment. *The whole professionals* attribute covers the need of empathetic skillset among engineers by focusing on the need to integrate personal values and beliefs with professional goals and actions.

The Model of Empathy Framework was developed with engineering professionals as the core. While this framework was not developed specifically for engineering educators, Walther et al. explain that this framework can be used as a "lens to further develop emerging research that considers conceptions of empathy held by engineering educators" [1, p. 142]. This framework is used in this study to view engineering educators as professionals and to understand how they perceive and implement empathy in their teaching profession. The attributes and dimensions will be used as codes during the data analysis phase of this research and are used to structure the findings of this project.

Positionality: The first author, Bala Vignesh Sundaram, has three years of teaching experience as an Assistant Professor in Mechanical Engineering prior to beginning his PhD program in Engineering Education Systems and Design at Arizona State University, which helps provide a common ground with the engineering faculty participants. His prior teaching experience allows for a more comfortable sharing experience for the participants. Based on personal experience as a faculty, Bala believes that teacher empathy is needed within engineering education and has positive benefits for both the students and the faculty. This bias is kept in check by self-reminder about the same before data collection and data analysis. Moreover, Bala's background as an International PhD student will help him gain a new perspective of the teaching and learning scenarios in the US and critically examine the rules and norms that may be assumptions of researchers who have only been based in the US. The second author, Nadia Kellam, is Bala's faculty advisor and they have taught for 15 years and have focused qualitative research efforts on engineering faculty and emotions in engineering education, which helped contextualize this current research project. During analysis, Nadia served as a critical friend and helped Bala consider his possible biases in analysis of the data through ensuring that conclusions were grounded in the data. The third author, Shawn Jordan, was Bala's professor for an Applications of Qualitative Methods for Engineering Education Research course. He mentored Bala through

refining his initial research proposal, operationalizing the qualitative research methods, and supporting difficult data collection at the beginning of the pandemic.

Methods

Participant selection: We selected a large public University in the southwest US as the research site for this pilot study. We used purposeful sampling [25] to select and recruit participants. The main criteria is that faculty members should have either an engineering background or belong to an engineering department. The list of faculty members belonging to various engineering departments was taken from the University website. Gender, designation (Assistant Professor, Associate Professor and Professor) and years of experience were considered while reaching out to the faculty members to ensure a diverse participant pool. Demographic data related to race/ethnicity was not collected in this study. In future work, this data will be collected and used to ensure that the participants are diverse in their race/ethnicity, gender and other identities. Potential participants were contacted through e-mail. Four faculty members showed willingness to participate in the study. All four members were male and three of them were Assistant Professors and one of them were Professor. Their specific engineering department are not mentioned to maintain confidentiality. One of the faculty members has a psychology background but is working in an engineering department. One of the faculty members had engineering background but is in a Design department which is not within the engineering school. The lack of gender and racial/ethnic diversity of participants is a limitation to this study and the implications of this are discussed in more detail in the limitations section. Table 1 represents the basic participant demographic information along with their pseudonyms.

Table 1: Participant information

Participant Pseudonym	Professional Background	Department	Designation
Adam	Engineering	Engineering	Assistant professor
Dante	Non-Engineering	Engineering	Assistant professor
Hector	Engineering	Engineering	Professor
Jason	Engineering	Non-Engineering (Design)	Assistant professor

Data collection: A semi-structured interview [25] was used to collect data for the project. The interview questions were directed to bring out the participant's direct and indirect perceptions about empathy and empathic interactions with students and lasted between 30 to 45 minutes. Some of the interview questions that were asked were,

a. If there is any, could you share one or two positive experiences, or a very memorable interaction in your class with your students? and,
b. In your own words, how would you define empathy?

The interview was audio recorded and was transcribed by the researcher. The transcribed data were anonymized to ensure confidentiality of the participant's identity. The researcher shared the transcribed data with each participant for member checking. Participants checked the transcripts for any inconsistency and highlighted any data that they wanted to be removed to maintain confidentiality. For example, one participant highlighted department information to be removed

to ensure confidentiality. Member checking also ensured the validity of the collected data by reducing researcher bias. Analytic memos were used to guide the analysis but were not used as data.

Data analysis: The transcribed data was coded using Dedoose software. A mix of inductive coding (creating codes during analysis) and deductive coding (creating codes before analysis) methods were used in the study. The deductive method was used to create the concept and thematic codes based on the Model of Empathy Framework. The coding process was done in three cycles [26] or passes of analysis. *First cycle coding* involved inductive coding using in-vivo codes (this type of coding involves using direct quotes as codes; not the coding software). *After first cycle coding* involved deductive coding using concept codes developed using the attributes from the Model of Empathy Framework [1]. For example, an in-vivo code, "I really felt for the student" captured the participant's empathic socio cognitive process. This in-vivo code was then categorized under *Affective Sharing* concept code developed in the *After first cycle* coding. Deductive thematic codes were developed based on the three dimensions of the framework (Skill, Orientation and Being dimension). These three thematic codes were used for the *second cycle coding*. Relevant in-vivo codes were grouped under appropriate concept codes to capture and highlight the participant's voice. Inductive coding allowed us to capture the possible new attributes unique to the engineering educator context. Table 2 provides the concept and thematic codes and their descriptions used in this study. A complete codebook with definition and example excerpts is provided in Appendix.

Table 2: Thematic codes and their corresponding Concept codes (attributes) with their description [1]

Concept Code	Description
Theme 1: Skills dimension - Captures the socio cognitive process	
Affective sharing	Person's capacity to share the emotional state of the other. Cognitive mechanism - automatic mapping between self and others
Emotion regulation	Ability to influence the ways in which they experience and express the emotions resulting from empathetic interactions with others. Intended to prevent undue "empathic distress" or "emotional over-arousal"
Mode switching	Ability to recognize, consciously apply or switch between empathic and analytic cognitive mechanisms
Perspective taking	Ability to adopt more or less consciously the subjective point of view of the other
Self and other awareness	Ability to feel with others and experience their internal world as if it were our own while being aware of and never losing the 'as if' quality
Theme 2: Orientation dimension - Captures the mental disposition as per the framework	
Epistemological openness	Recognition and valuing of the subjective experiences and perspectives of others as valid and important sources of knowledge of engineering work in practice.
Micro to macro focus	Awareness and consideration of structures of power and social organization as both contexts and consequences of engineering work
Reflective values awareness	Not only to be attuned to the inherent values dimension in engineering, but also to be oriented towards fully engaging with ethical issues

	through critical consideration of their impact on both a professional and personal level
Values pluralism	Commit to engaging in an active, purposeful, transparent and equitable discourse around heterogenous values. Informed purposes driving different forms of engineering work
Theme 3: Being dimension - Captures the contextual framework as per the theoretical framework	
Dignity, worth of people, and natural environment	A genuine belief in the dignity and worth of all people. Inherently implies an epistemological openness that is reflected in adopting a strengths perspective when interacting with others
Engineers as whole professionals	The need to develop empathic skills and orientations alongside intentional connections to students' maturing personally and morally
Service to society	Includes a deep consideration of, and genuine service to all human and non-human stakeholders impacted by engineering

Limitations: The number of participants in the study is one of the limitations. The current participants were all male and three of them were Assistant Professors. Another limitation of this study is the lack of female and non-binary faculty members as well as members in Associate Professor designation. Therefore, the findngs of this study are limited in scope to the views of male engineering Assistant Professors. While their perspectives are valid and represent a portion of the engineering faculty demography, the validity of the final findings could be increased by extending this pilot study with engineering faculty members of other designations and genders.

Results

The results of the study are organized as per the Model of Empathy Framework. The three themes were created with the three dimensions of the framework, namely, Skills dimension, Orientation dimension and Being dimension.

Skills Dimension: The skills dimension provided clear insight into the participants' socio-cognitive aspects of their perceptions of empathy in their profession. Each of the five attributes from the model aided in deeper understanding of the views of the participants in terms of being empathetic towards students. All four participants expressed their perspective in this dimension of the model. It was interesting to find that Hector shared very little views on empathy skills, but his classroom interactions expressed relatively more about his enactment of empathy than his views. When asked about his ability to empathize with the students, Hector mentioned, "I don't know, I don't have a good feel for that and unless they make it known to me, I won't know it." But when the students did express their need of support or help or extension on an assignment, Hector did listen to the students and would accommodate it if he felt that the request was reasonable.

Mode switching was the main aspect that was covered in all the participants. Every participant indicated one or the other form of switching between technical content delivery and being attentive to student's situations and needs. Some participants expressed clear indications of their internal frustrations and disappointments and how they tried to be professional in their behavior and have control over their emotions. For example, Adam explained, "And I know they're not looking at my lecture notes because my lecture notes are on the projector. So that's a little frustrating for me and every once in a while, I'll say something about it, just remind people to be

looking at me or, or the screen." During lectures, Adam noticed that the students do not look at the lecture notes and had to regulate his frustration in regard to the students behavior and gently but consistently inform the students to look into the lecture notes while teaching in a class. The faculty had to switch from technical explanation of the engineering concept, embrace his frustration, consciously choose to regulate it, make an attempt to be empathetic towards the students and gently remind them to look at the slides thus indicating the faculty's mode switching ability. Dante indicated that the need for perspective taking is not just from faculty to student, but it should also be from the student to the faculty, explaining that "Students need to have empathy for instructors." This point was unique but was not discussed in depth due to the limited scope of this pilot study. It will be taken into consideration in future research (as mentioned in the implications section of this article). Jason indicated similar aspects of perspective taking by pointing out that the students should be able to learn how to be empathetic not only with peers but also with their professors and with the course that they are learning. He explained, "I think it really needs to be a two-way street, empathize with not only where the professors are coming from, but also where the craft is going." Dante also clearly indicated that a faculty does not have to agree with the student's situation, but it is enough to be understanding of their situation. Dante stated as part of his definition of empathy that, "trying to understand what other people are feeling and thinking, not necessarily agreeing with it." This way of framing empathy focuses on the process of understanding the other person's emotion/situation but not getting involved with their emotion or situation. This referral to cognitive empathy indicates a rather narrowing perspective towards empathy in engineering education than a more enriching one.-These results highlight how faculty discussed empathy skills as something important for faculty to have, but also, surprisingly, they explained that they felt that students also need to develop their empathy skills.

Orientation Dimension: The mental disposition of the engineering faculty members was appropriately captured by the orientation dimension of the model. Each attribute (as defined in the codebook and in the framework) within the dimension provided a clear understanding of the perspectives of the faculty members about empathy. Adam and Dante provided their perspectives that were in alignment with the orientation dimension. Their actions and behaviors in class were strongly influenced by their way of imparting empathy with the students. *Epistemological openness* was clearly indicated as Dante mentioned, "I think instructors need to have a sense that students are people who have lives outside of the classroom, who have challenges, good times and bad times." While discussing about the various situations that might arise in class and during student interactions, especially related to assignments and requests for extension of deadlines, Adam mentioned, "there could be genuine circumstances", expressing his way of being open to other perspectives. It was interesting to find that the participants perceived limitations of how empathetic they could be with their students based on their faculty designation. Adam mentioned that although he understood a difficult situation of a student, he expressed his lack of power to help the student as "that was not within my bounds [as assistant professor] to do" pointing out his limited power and authority as a course faculty to help the student with their personal issues. Dante mentioned that a faculty cannot be a student's confidant and that the information shared with a faculty will be a filtered version which restricts the extent to which a faculty can help a student. Dante explained, "they may not tell you anything about their lives or they tell you about their lives, but it's sort of a filtered version. Because you know, you're not their friend, you're not a confidant." The participants also expressed their view of being empathetic is to have open and

direct conversations and express their opinions. This view was clearly in alignment with the *values pluralism* attribute of the orientation dimension.

Being Dimension: The being dimension of the framework encompasses the broader contextual framework that a person in the engineering field might have to be empathetic. It was interesting to note that Jason had a different perspective from the other participants. He indicated that his contextualization of empathy is to primarily impart it as a skillset to the engineering students. This was in alignment with the *engineers as whole professionals* attribute of the being dimension. Jason was integrating the need to empathize with the content of the course and aid the students to think more broadly and not to get confined within marks and grades for the course, "They were starting to think not necessarily excuses for why it wouldn't work but really starting to understand just their limitations. And then things they would need to learn." Adam explained that the worth and dignity of all students should be considered equal and their diversity should be considered while trying to teach an engineering concept. He stated, "Engineering has a very big diversity with regards to theoretical learning and practical hands-on learning. And this difference I see, in all the students coming into my courses and so it [empathy] becomes important because of the diversity." It is interesting to note that the service to society aspect was not captured explicitly among the participants in this study. The concept of service is implicitly captured through the *reflective values awareness* and *micro to macro focus* attributes; however, none of the participants exhibited explicit connection of their empathic behavior to the "service to society" concept.

Discussion

The main aim of the study was to understand the perspectives of engineering faculty members about the need of empathy in an engineering classroom. The results were in alignment with the broader study of defining empathy within engineering and comparing those definitions with other disciplines. These findings are also in alignment with the findings of Hess [20] and Strobel et al. [19] where they provided major definitions and perspectives of engineering professionals and engineering faculty members. The results of this study had similar and broad definitions of empathy within engineering education and supports the possible tensions that were highlighted by Strobel et al. [19] due to the presence of various levels of empathy within engineering.

The use of the Model of Empathy Framework [1] to understand the definitions and perceptions of empathy among engineering faculty members enabled the effective understanding and categorization of their views as per the framework. While the framework was developed with a broader perspective to impart empathy as a teachable and learnable skill within engineering, the emphasis was mostly on how to impart empathy as a skill among engineering students. The framework did not seem to consider engineering faculty members as part of the engineering domain in the framework development although engineering faculty members fall under the broader engineering umbrella though they are not directly involved in the profession as engineers. Walther et al. had highlighted the same in their article and posited that the framework also has the potential to help understand the conceptions of empathy held by engineering educators [1]. This pilot study proved its potential as a lens to understand the perspectives of engineering educators about teacher empathy.

Implications and future work

While the study showed that the framework captured the conceptions of empathy of engineering faculty members, it also highlighted some unique take of empathy among engineering faculty members that defines how empathy is experienced by engineering educators. This indicated the need for a tailored framework to define and measure empathy among engineering faculty members. This implies that there are still more aspects that could be uncovered about faculty perception of teacher empathy. Future research with a more diverse participant sample is needed to verify and justify the effective use of the Model of Empathy framework to understand engineering educators' conception of teacher empathy. It was also noted that some of the participants expressed the need for student empathy towards teachers. This could be another possible future work to understand the engineering faculty members' view on the need for student empathy in a student teacher classroom interaction. Further research on teacher empathy within engineering education could also help in incorporating the benefits of teacher empathy proved in K-12 and higher education into engineering. Another possible future work is to utilize the findings of such research to develop a more complete framework of empathy that accounts for faculty, students and staff in engineering education.

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Appendix

Codebook

Title	Description of the code	Example excerpt
Dignity, worth of people, and natural environment	A genuine belief in the dignity and worth of all people. Inherently implies an epistemological openness that is reflected in adopting a strengths perspective when interacting with others	“Engineering again has a very big diversity with regards to theoretical learning and practical hands-on learning. And this difference I see, in all the all the students coming into my courses and so it becomes important because of the diversity.”
Engineers as whole professionals	The codes and excerpts that show that the actions taken by the participant is helping the student to become a whole professional	“Students need to have foundational knowledge not just superficial knowledge at the top.”
Service to society	Include a deep consideration of, and genuine service to all human and non-human stakeholders impacted by engineering	N/A
Epistemological openness	Recognition and valuing the subjective experiences and perspectives of others as valid and important sources of knowledge of engineering work in practice.	"There could be genuine circumstances."
Micro to macro focus	Awareness and consideration of structures of power and social organization as both contexts and consequences of engineering work with more emphasis on the power structure that controls the participant - such as university policy and scope of role as a faculty	"That was not within by bounds to do."
Reflective values awareness	Not only to be attuned to the inherent values dimension in engineering, but also to be oriented towards fully engaging with ethical issues through critical consideration of their impact on both a professional and personal level with more emphasis on ethical standards and	“Because that's not ethical and absolutely not fair and absolutely not within University policy bounds and so that's not... And I, I think it's wrong that... Just because one has the

	how the participant's actions might have an impact on the life of the student. Reflecting upon the possible outcomes	situation you think, but you should.”
Values pluralism	Commit to engaging in an active, purposeful, transparent and equitable discourse around the heterogenous values. Informed purposes driving different forms of engineering work	“I tell them, ‘You can ask me anything that you have in mind’, and that gives me a chance to explain to them, if there is something inappropriate that they're asking for me to accommodate or to do.”
Affective sharing	Person's capacity to share the emotional state of the other. Cognitive mechanism - automatic mapping between self and others	“It breaks my heart to see a student who has been trying so hard, in the end fail because, because they just couldn't do it, maybe do well in the course.”
Emotion regulation	Ability to influence the ways in which they experience and express the emotions resulting from empathetic interactions with others. Intended to prevent undue "empathic distress" or "emotional over-arousal" but more emphasis on regulating the emotions and how they experience but manage to not display the emotions	“And I know they're not looking at my lecture notes because my lecture notes are on the projector. So that's a little frustrating for me and every once while I'll say something about it, just remind people to be looking at me or, or the screen.”
Mode switching	Ability to recognize, consciously apply or switch between empathic and analytic cognitive mechanisms. Mostly concentrates on places where the participant changes the role from a technical teacher to a person who understands and tries to answer some of the non-technical issues faced by the students	“So, I won't say that's the wrong direction, I say I'll ask some, why aerodynamics may not be what you need to consider. And you know, it's lengthy. It's a, you know, I could be working with the team for 45 minutes; when I could have just said reduce the friction, reduce the surface area. But that's too easy.”
Perspective taking	Ability to adopt more or less consciously the subjective point of view of the other but more emphasis is given on	"I understand it's also scary for students"

	intentional step taken by the participant to understand the situation of the student	
Self and other awareness	Ability to feel with others and experience their internal world as if it were our own while being aware of and never losing the 'as if' quality but concentrates more on the "not losing the 'as if' aspect" part of the definition. Also it covers the places that shows that the participant is cognizant of both himself and the student's situation	“They have to contact me or a professor to tell us what's going on. And I think, it's good to be conscientious and aware that these things are happening. I understand it's it's also scary for students because, they don't wanna, they don't want to share their problems in a way that makes it feel like they're asking for something special.”