Kindness in Engineering Education

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Abstract
In light of the disruptions in higher education brought about by COVID responses, faculty were encouraged to be more accommodating of student issues. These edicts largely could be construed as showing kindness. But why should faculty kindness toward students only be manifested in the face of a global pandemic? Even before the pandemic there was a growing mental health crisis in higher education, just one driver of many to spur faculty to treat students with kindness. This paper explores issues of kindness in engineering and engineering education. What evidence is there that kindness is congruent or incongruent with engineering education? What is the value of considering kindness in comparison to the constructs of care, empathy, and compassion? The perspectives of a variety of scholars are synthesized in this analysis. This is followed by concrete examples of teaching and course practices that are emblematic of kindness, such as compassionate pedagogy. The author argues that kindness is appropriate to embody within engineering education, irrespective of externally obvious stressors like a global pandemic.

Introduction

Kindness perhaps seems like an overly simplistic response to the weighty issues of higher education that became exacerbated and exposed concurrent with a global pandemic. Higher education overlays life, which has always included the sickness and death of family and friends. There was already a growing awareness and perhaps incidence of mental health issues among students [1-8], likely exacerbated during the COVID pandemic [9-10]. And 2020 also revealed to a greater extent long-standing issues and trauma associated with racism and poverty [11]. Until 2020, many faculty, staff, and administrators in higher education had the privilege and good fortune to personally avoid many of these challenges. But the pandemic touched us all. Higher education institutions faced tough choices about in-person versus remote / online instruction and safety protocols. And many institutions encouraged faculty to be more understanding with students – by accommodating absences and considering the challenges of learning in new ways [12-14]. While some question whether institutions' motives were driven by finances, in many instances the upshot appeared to be calls for kindness. Kindness can be extended to all, regardless of the presence or absence of particular circumstances. In this paper the notion of kindness and its place in higher education is examined. I will advocate for engineering faculty to practice kindness toward students, others, and themselves. By embodying kindness in their practices, faculty serve as role models for students that kindness has a place in the engineering profession.

This philosophical exploration is a synthesis of published literature and personal musings. The paper first explores the definition of kindness and related concepts. This is followed by synthesizing key literature on kindness in education. Some examples of teaching practices that embody kindness toward students are described. The paper concludes by re-iterating key points and extending speculations on broader issues.

Definitions

Kindness is manifested through actions and behaviors that provide emotional or physical support

and benefits for other people, and are self-motivated. Knafo and Israel [15] define kindness as a "constellation of positive attitudes, feelings, and behaviors toward others (including variables such as empathy, prosocial behavior, generosity, and altruism)" [p. 168]. Why focus on kindness rather than the related ideas of compassion or empathy? Kindness in the literature is more commonly associated with children and PK-12 education, while more sophisticated ideas of compassion or empathy perhaps seem worthy of mature students and higher education. The definitions for kindness and the related ideas of compassion, empathy, and care (Table 1) helps to inform this choice. Each of these concepts are related but have a variety of subtle differences. There is also a lack of a singular definition for all of these concepts. The key references supporting the ideas in Table 1 are not intended to be exhaustive; many of these citations include a more exhaustive analysis of each concept and themselves cite a number of references.
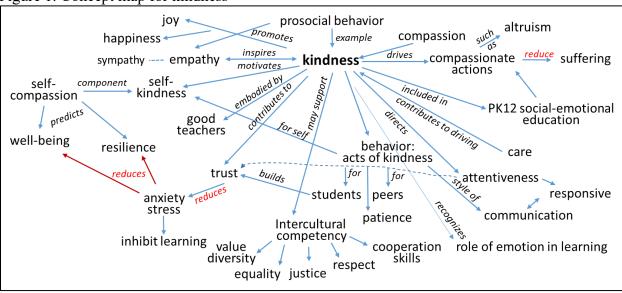
Table 1. Definitions of Kindness and Related Concepts

Term	Definitions and key ideas	Reference
Kindness	Prosocial behaviors	Kaplan [16]
	Virtue, similar to benevolence, moral obligations, moral feelings; "lack of kindness leads for sure to the failure of any educational attempt"	Cozma [43]
	Trait among top character strengths valued in Western society Range of definitions in Binfet Table 1	Binfet [17]
Self-kindness	"Being caring and understanding with oneself rather than harshly critical"	Smeets [18]
Compassion	The feeling that arises in witnessing another's **suffering** and that motivates a **subsequent** desire to help	Kaplan [16]
Self-compassion	Includes self-kindness, sense of common humanity, and mindfulness	Smeets [18]
	Leads to well-being and resilience, promotes mental health (lower depression, lower anxiety)	
Empathy	Understanding or feeling what another person is feeling	Hess [19]
Care / caring	"A major value of relational ethics connected with education"	Cozma [43]
	Understanding other's needs and interests	
	Receptivity, relatedness, responsiveness, reciprocity	

Overall, the notion of kindness was preferred because it implies actions that help others, regardless of the extent to which one understands what others feel (empathy) or understands their situation (presence or lack of suffering that triggers compassion). Kindness avoids the bias that could result from misinterpretations associated with empathy, argues Bloom [20], because one can behave with compassion regardless of understanding. Further, empathy does not come easy to all people. It has been noted that individuals on the autism spectrum often possess lower empathy and these individuals also may gravitate toward STEM (e.g., [47]). Thus, focusing on kindness rather than empathy may be more universally achievable. Kindness avoids setting up a hierarchy. There are not 'victims'. We don't need to understand the particulars of circumstances and sit in judgement. Kindness is also associated with the positive emotions of happiness and joy, in contrast with compassion [27]. Further discussion of the affordances of kindness as a model for engineering are discussed after the literature survey process.

Connections between kindness and other concepts that resulted from an attempt to summarize the literature are shown in Figure 1. While certainly not exhaustive, keeping these relationships in mind is helpful.

Figure 1. Concept map for kindness

Literature

A number of publications discuss the idea of kindness and the related concepts of compassion and empathy with respect to education (numbers identified in Table 2). A Web of Science search [48] found that the term empathy (or empathetic) was a much more common idea in higher education and engineering than compassion, which in turn was much more common than kindness. Papers that resulted from the search on kindness and education were generally related to PK12 or medical settings (nursing and medical school). The pre-college papers tended to focus on teaching kids and students to be kind in their behavior toward peers and more broadly. This had a focus on fostering kindness in pupils among an array of prosocial behaviors, sometimes included with social-emotional education. The medical school settings tended to focus on teaching future professionals to be kind in their practice and engagement with patients, and also included the notion of promoting a culture of 'intelligent kindness' [21]. Thus little of the literature discussed how faculty embody kindness toward students, peers, or themselves.

Table 2. Number of papers and terms related to kindness, compassion, and empathy in literature searches

	Kindness	Compassion	Empath*
Source / search terms			
Web of Science (topic)	4,299	16,829	63,334
+ "higher education"	0	86	442
+ engineering	21	68	621
+ education	493	2,270	11,536
+ kindness	--	777	493
(title)	1,069	6,264	14,419
ASEE PEER (title)	0	1	32
JEE search	5	17	60
IJEE advanced search	3	21	143
29 Kindness papers			
Total counts of term	1341	1054	819
No. papers with term	29	21	21

Within engineering education, formal considerations of kindness in published literature appears minimal. A search via the American Society for Engineering Education (ASEE) PEER system found no papers that included kindness in the title, in contrast to compassion and empathy. Similarly, searches of the *Journal of Engineering Education* (JEE) and the *International Journal of Engineering* (IJEE) found more frequent discussion of empathy and compassion, and very little inclusion of kindness.

Twenty-nine papers were selected for more detailed exploration based on having a focus on kindness; this included 19 journal manuscripts [17, 18, 20-36], 5 book chapters [15, 37-40], and 5 conference/guidebook papers [42-46]. Searches within each document were used to identify the frequency that specific terms occurred. All 29 papers included the term kindness 5 or more times (median 29 mentions, with high of 157) or had kindness in the title (26 papers, including 2 with kindness in the title but not mentioned more than twice in the paper overall). Among the 29 papers with a kindness focus, it was notable that the majority were authored by individuals outside the U.S. (62%, primarily UK and Canada, also Sweden, Netherlands, Israel, Barbados, Romania), first-authored by women (62%; only 28% of the papers had only male authors compared to 38% that had only female authors), and psychology and education were the most common disciplines of the authors (41%, 28%). Within the 29 kindness papers, 21 papers also included compassion (8 with higher word count for compassion than kindness) and 21 papers also discussed empathy (6 with higher word count for empathy than kindness). Related terms that commonly appeared in these 29 papers also included: caring (20 papers), respect(ful) (17 papers), ethic(s/al) (15 papers), and altrui(sm/stic) (14 papers). A detailed exploration of notions of care in engineering was conducted by Strobel et al. [41]. Kindness may be more active and personal than care, as in showing kindness to others (or even oneself), and avoids potential confusion around notions of care and diligence in conducting accurate calculations. This quick analysis shows the inter-relatedness of the ideas of kindness, compassion, empathy, and caring, illustrated somewhat more clearly in the concept map (Figure 1).

Why Kindness?

The strongest proponent for a kindness mindset and value in engineering education is perhaps George Catalano. Kindness is one of the components in his model of engineering decisions based on love [49]. Catalano proposed "a fully integrative approach to engineering problems incorporating both reason and compassion in the development of solutions" which manifested from a morally deep worldview [50, p. 60]. However, the role of empathy in engineering has been far more widely explored in engineering education than kindness (see Table 2). Historical links of kindness to feminine qualities [31,67] may contribute to its low exploration in engineering, which in the U.S. is widely viewed to embody masculine norms [68].

While cognitive empathy indicates understanding the thoughts and feelings of others, this seems to be a particularly challenging and difficult exercise when one considers differences in culture, experience, and background. In fact, it almost seems conceited to believe that one can truly understand another person in that way, as it relates to professional contexts (e.g., an engineer working with community members; a professor teaching a student). Bloom [20] calls attention to the potential for bias associated with empathy. As an alternative, Bloom lobbies for compassion. One can behave with compassion regardless of understanding. I posit that the same is true with

respect to kindness. Acting with kindness does not demand empathy. More expansive definitions of empathy extend to emotional empathy (sharing the emotions of others) and empathic concern (wishing to improve the experience of others) [51]. Zaki [51] notes, "Empathy's most important role, though, is to inspire kindness." (p. 4)

A lack of personal interaction with students makes empathy particularly challenging. Online interactions as universities moved to remote instruction during COVID further complicated developing personal ties. "Technology is widely viewed as our era's biggest threat to empathy" [51, p. 145]. Large classes in particular may challenge our ability to get to know our students, build trust, empathize, and ultimately evidence compassion. Thus, kindness may be particularly important in these settings. Zaki notes "those of us in power have a responsibility not only to be kind but also to create ecosystems in which kindness is expected and rewarded." [51, p. 143]. Setting expectations for kindness in our courses in how all individuals interact with each other (teachers, teaching assistants, and students) may help facilitate feelings of social inclusion, which has been linked to inclusion and broadening the participation of traditionally underrepresented groups [25]. This classroom culture may foster actions of micro-kindness [29].

One challenge in engineering may be that we normally consider large numbers of individuals in our work; for example, all of the customers who may buy our product or an entire city who may travel the roads that we have designed. Zaki [51] states, "in laboratory studies, people express more empathy for one victim of a tragedy than they do for eight, ten, or hundreds." (p. 9). Thus, the sheer scale of traditional engineering work with sometimes rare interactions with the individuals most impacted may make empathy (and perhaps by extension kindness) more difficult among engineering in comparison to professions like medicine (e.g., doctors meeting with single patients). Thus, the notion of 'care' may be more applicable to the engineering profession in the context of this broader impact of our work, while kindness is more relevant in engineering education as we interact with individual students.

The hidden curriculum through engineering courses that do not seem to embody kindness or caring might convey to students that a lack of kindness of part of the culture of engineering itself. This role model function of faculty is important [38]. For example, in the name of 'rigor' [58] engineering faculty may avoid giving students accommodations which could reduce their failure rates in courses. If students contrast their experiences in engineering courses with non-engineering courses [39] they may conclude that engineering itself is uncaring as opposed to attributing the lack of care to an individual instructor or higher education.

Reading manuscripts that discussed the role of kindness in healthcare, I found many parallels with engineering. For example, Campling [21] states: "studies suggest that the majority of *healthcare* students are motivated by the wish to make things better, but during their training become more distanced from *patients* and less empathic." Here one can imagine 'healthcare' and 'patients' could be replaced with 'engineering' and 'people'. They describe that patients discuss the "degree and quality of kindness they have (or have not) experienced" [21]. Again, there are parallels with this to students' descriptions of class experiences, where anxiety and performance have been linked to perceptions that their instructor cares about them, is helpful, and wants them to succeed [55]. The same paper discusses the culture of healthcare and advocates for a culture that promotes kindness and caring. It could be similarly argued that the culture of engineering is

part of the problem. The 'culture of disengagement' in engineering identified by Cech [56] is mirrored in the decreases in empathy measured among medical students [35, 57]. The culture of engineering also embraces objectivity, meritocracy, and an orientation toward things [52-54]; these are attributes that are not clearly aligned with ideas of kindness. In addition, the "perverse dynamics" of "individualism, consumerism and the hegemony of market forces" described in association with healthcare [21] also present challenges within both engineering and higher education.

Practical Examples of Kindness in Teaching Practice

Behaviors that embody kindness in teaching include treating all students with respect and care, offering students compassion, slowing down, offering respectful silence, and sharing personal stories. Sharing personal stories and being relatable to students embodies the notion that "we cannot stand apart from those we teach" [36]. We need to care about what our students think, feel, and desire, and let students know we care through both our words and our actions. Students should understand that we want to help them learn, and that we believe they can successfully learn. Three specific areas of embodying kindness in teaching practices are explored in more detail below: the syllabus / course policies, authentic listening, and giving/receiving kindness. The descriptions of these from published literature are summarized, followed by my personal experience with those elements in fall 2020 courses.

Syllabus and Course Policies

Kindness in teaching can begin when a faculty member considers the rules for the class, articulated on the syllabus. Being clear about the expectations in the course by providing a detailed syllabus can be viewed as an act of kindness [59]. For example, there was no penalty in students' perceptions of instructor support even when fairly restrictive policies were articulated [60]. Inviting students to attend office hours, explaining policies for office hours, and extending the potential to meet with students beyond pre-established meeting times are all practices that embody kindness. Inviting students to meet at self-arranged times may be particularly important for non-traditional students who may be juggling a complex array of work, personal health, and/or home responsibilities (such as child care, caring for siblings, caring for elderly parents). This should also acknowledge that students coming to college may not understand the intent of office hours, and therefore the purpose of office hours should be articulated. A great example of the text for office hours from Prof. Kissane of Lafayette College was described in [60, p. 130]:

> This semester I will hold office hours on DAYS and TIMES.

> This means that during those hours, you need not have an appointment to talk to me – just stop by my office during that time. Office hours are a time when you can come to ask me for assistance in understanding course materials or assignments, or they can merely be an opportunity to chat with me about the course or how the course relates to current events, college more generally, or anything else you want to talk about with me. Do not feel like you need to have a "good" question or reason to come to office hours – you can just pop in to say hello if you want! And if you cannot make my office hours because you have a conflict, I'm happy to meet with you at other times - just make an appointment.

The syllabus should also include supportive statements, e.g., ''If you find yourself doing poorly in the course, please come and talk to me" rather than "Please do not let yourself fall behind" [62]. Avoid pre-judging students' abilities or motivations, giving each student in your class encouragement that they can succeed [36]. In addition, statements on inclusion and accessibility should be carefully examined to review language, tone, and scope, thereby working to avoid 'othering' students or making them feel that they don't belong [63].

In fall 2020 I took special care with my syllabus and course policies in my first-year introductory engineering course. Unlike a normal semester, the course was entirely online. It was intended to be synchronous, but a few students were across the world making the lecture time challenging. I carefully explained the purpose of office hours and encouraged students to attend for both course-related and general questions. Due to COVID all office hours were online. Students were given an opportunity to earn extra credit the first time they visited me during office hours. This approach was used to help break down their hesitancy. Another key change from previous years related to the course policy of dropping the lowest two homework scores from each student's grade (which could including skipping up to 2 assignments). This easy change accommodated unexpected illness or other circumstances of the students. In addition, for attendance points students were allowed to miss three of the 15 course meetings without penalty. No doctors note or other documentation were needed, it was simply an acknowledgment that unexpected circumstances might arise. The distribution of final grades in the course was generally similar to typical years when the class was in-person; 2 of 59 students failed the course and all other grades were a C or better in 2020. Given the stressful conditions of the semester (COVID quarantines in the dormitories, combination of in-person socially distanced and fully online courses, an unexpected 'full shutdown' of in-person courses for an unknown duration), I was pleased overall with student engagement in the course.

Authentic listening

Authentic listening is a process by which we carefully attend to what another person is saying, investing genuine effort in being fully present and understanding the other person. To facilitate authentic listening among students during classroom discussion, the "talking stick" approach employed by Catalano [64] could be used. The person in possession of the talking stick has the right to speak while others listen. Catalano describes using this in a class of 58 students as a "tool for encouraging everyone to speak but even more importantly it demands that everyone listen to the voices of others." [64, 2016 pg. 5]. This approach seemed generally well-received by students [65]. (It would be possible to try this in an online synchronous class via control of the instructor, requiring that all students have their cameras on. However, unavoidable distractions in our homes complicates this focused listening process.)

Another approach is for faculty to "ask students what we can do to better serve their needs and enhance their academic experience." [66] The success of this approach relies on open communication and trust. In recommendations for working specifically with first-generation students (FGS) Hao [66] states:

> "I made a conscious effort to talk to my FGS individually during office hours to discuss their progress in class and ask them if I have met their pedagogical needs. Some of the questions I asked were: Is the pace of the class working for them? How are the readings so far? Do they

face significant challenges with the assignments? … there are so many unwritten rules of the academy that FGS must learn on their own without the parental or family guidance that their peers typically have, we must serve as mentors to these students."

I tried these approaches in my introductory engineering course for first-year students. The initial assignment in the course asked the students to reflect on their personal interests and goals for engineering. The students were given three options to complete the assignment: a traditional written response, recording a short video, or individual discussion with the professor. Because the course was online due to COVID, these different modes of completing the assignment allowed me to get to know the students better. The individual meeting version allowed me to practice authentic listening, ask students if they had any concerns, and let them know that my role was to support them on their educational journey. A few comments on the anonymous student evaluations of teaching at the end of the semester seemed to indicate that some students appreciated this approach (e.g., "She was very kind and available whenever I had a question or needed help. She always respected my opinion and listened to any problem I had.")

Giving and Receiving Kindness

Those who give kindness reap benefits in their feelings of well-being [45]. So providing students opportunities to give kindness to others may be impactful. There are examples of this through service-learning activities [46] and through acts of intentional kindness [45]. An ideas that fits into more traditional engineering courses with team projects includes requesting that teammates give a few elements of positive feedback to their peers. In most engineering settings the norm appears to be that good behavior is not commented upon because it is expected. That means that people are more often given critiques or negative feedback. Intentionally asking students to give peers positive feedback may benefit the giver (and receiver). Similarly, an opportunity in the middle of the term to give positive feedback to teaching assistants (TAs) and/or the professor could be meaningful. This can have a practical benefit by allowing students reinforce what they like.

In courses related to professional skills or transitioning to college, specific training on self-kindness could be integrated. Smeets et al. [18] described a group intervention around self-compassion. Although this was done outside-of-class with volunteers, a similar activity could be integrated into a course with the appropriate scaffolding. For example, students could be given the assessment instrument (the 12-item self-compassion scale), and a discussion of the literature around self-compassion correlating with stress and anxiety, which in turn correlates with academic success. This could be integrated with other activities and self-awareness exercises related to time management and other important professional/life skills. Students could then opt in to a personal growth exercise of their choosing. Allowing individual students the autonomy to choose their own learning path is a good strategy (based on expectancy-value theory). These activities might also have benefits in broadening diversity in engineering; Smeets et al. [18] reported that women generally have lower self-compassion than men.

From the perspective of teacher engagement with students, Cramp and Lamond [22] discussed that when and how teachers engage with students can be acts of kindness. They studied a fully online, primarily asynchronous graduate-level education course where the four students engaged

in critical / collaborative learning largely via threaded / responsive online discussion boards. The three video conferences with students were identified as key points to create community cohesion. The acts of kindness of the online learning tutors (co-instructors) included giving friendly and informal responses to student posts via Facebook, supporting student control, giving formative feedback, offering one-on-one support, and timely availability for help. The instructors considered the interactions from the perspective of students and engaged with 'authentic well-intentioned professionalism' to establish collaborative learning that embraced respect, trust, and responsibility in acknowledgement of the emotional aspects of learning [p. 8]. It was particularly important to help students become comfortable in the unfamiliar online learning environment, and there was intentionality in supporting the students during the transition. The authors are clear that the course intentionally avoided a 'delivery' perspective on learning by employing the sociocultural lens of co-construction of knowledge and attending to the importance of emotion in learning. Similar themes were a focus in Erikson's [38] discussion of kindness embodied through communication in the learning process.

In my course with a team-based project, students were explicitly invited to give positive feedback to their teammates. While their ratings and critiques were confidential (to help award individual grades from the team project), students were told that their positive comments would be passed on. Each student gave at least one positive comment to their peers, while some gave as many as three specific positives per teammate. Further, as an instructor I tried to be available and give timely feedback. The option on three assignments for students to substitute a one-on-one discussion with the instructor rather than a traditional written paper provided an opportunity for the type of interactions similar to those described in [22]. While the direct benefits from this approach have not been quantified, I did not receive any negative feedback from students.

Summary and Final Thoughts

While the notion of kindness is not normally described as a trait associated with engineers or engineering, incorporating kindness into our teaching practices may yield positive results for our students, our colleagues, and ourselves. Exploring kindness as a distinct concept provides some benefits over the related concepts of empathy, compassion, and care. Applying a lens of kindness to our decisions about how we design our courses and engage with our students may provide affordances in facilitating student learning. This attends to the role of emotion in learning and the destructive role of anxiety. Small changes that attend to kindness might prove significant in creating effective environments for learning. This extends beyond, but may include, actions of micro-kindness. Kindness embodied within engineering education may help broaden participation and increase diversity in engineering. The institution may reap benefits from a culture of kindness in the metrics that it values of student retention and timely graduation, as well as positive feeling that might lead alumni to remain engaged and eventually give financial donations. Further, faculty are encouraged to practice self-kindness, which is important to combat stress and burnout. Future work might explore to what extent faculty perceive a culture of kindness from their institutions. The high-pressure environment that typically pervades the tenure process seems to evidence little kindness as new faculty navigate the demands for research productivity, grant writing, teaching, and service – some while facing their own array personal issues, harassment, and/or racism. As noted by Oades et al. [69, p. 436], "implementation of a kindness strategy may be best addressed at the organizational level,

through the adoption of values and agreed practices that increase the probability of kindness towards other people." If faculty perceive that they are treated with kindness and care from their institutions, they may be more likely to display and promote kindness in their interactions with students. While the reflections in this paper were catalyzed during a global pandemic that caused unusual stress on students and faculty alike, these lessons should be carried forward as standard practices that realize the benefits of orientations toward kindness in higher education.

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