Navigating Ethical Dilemmas in Civil and Environmental Engineering: Ethical Case Studies Based on Experiences of Early-Career Engineers

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Abstract

The work environment of engineering practice is evolving while challenging the early career civil and environmental engineers with unprecedented ethical dilemmas. This research explores some of the challenges faced by these young professionals as they transition into and navigate the complexities of their careers. We collected information, through in-depth interviews, on the ethical dilemmas faced by the young engineers and processed the data to summarize them in case study formats. Our findings revealed numerous challenges faced by the young professionals. Early career engineers often struggle with balancing the demands of their supervisors while upholding ethical standards, a struggle that influences both their professional integrity and the quality of their work. A few of the ethical issues brought up by the interviewees were on billable hours charged to irrelevant accounts, meeting deadlines and working overtime affecting the quality of their designs and accuracy, inclusion and support at the workplace, and overseeing projects beyond their qualifications and expertise areas.

In this paper, ethical dilemmas reported are analyzed and summarized as case studies, while highlighting the ethical considerations and complexities involved. References and attributes to the ASCE code of ethics and obligations of the engineers are made, to frame the scenarios in the ethical perspective. Moreover, thought-provoking discussion questions are developed for the case studies, aiming to assist engineering ethics educators. These questions are tailored to stimulate classroom discussions, enabling faculty to prepare their students for real-world ethical challenges. By engaging students in these practical, context-specific dilemmas, educators can foster a deep understanding of the ethical nuances in engineering practice.

This paper serves as a valuable resource for civil and environmental engineering ethics education. The case studies and discussion questions will provide an enhanced platform for engineering ethics educators to enrich classroom dialogue. By engaging students in these real-life scenarios, educators can empower the emerging group of engineers with the critical thinking skills and ethical awareness necessary to navigate the complex challenges of the engineering profession. Through equipping the educators with this resource, we aim to reinforce the ethical foundation of young engineers, ensuring they are well-prepared to uphold the highest standards of integrity as they embark on their professional journeys.

Introduction

Engineers have a major responsibility for protection of public welfare and the environment due to the nature of engineering projects and designs being closely related to both (Bielefeldt, 2022). Engineering education has long recognized the importance of integrating ethics instruction into the curriculum to prepare future engineers for the ethical challenges they may face in their professional careers. For this reason engineering educators have been developing modules or courses on engineering ethics to instill ethical reasoning skills in the graduating engineers (Herkert, 2000; Hamad et. al., 2013). There are many examples of curriculum development for

ethics exposure of students from first to senior year and through various modalities to relate ethics to the technical concepts of ethics (Rajan, 2017). Beyond basic discussion of ethics in class, effective engineering ethics instruction needs to engage students, promote critical thinking, and translate theoretical concepts into real-world practice. Another consideration that needs to be made is the spectrum between moral values and personal ethics on one end and professional and social ethics on the other end. This creates a need as well as an opportunity for a rich discussion in higher education as ethics is taught considering various perspectives of stakeholders and career stages of engineers (Bairaktarova and Woodcock, 2015; Murthy and Kosaraju, 2020). Recognizing these challenges, it has been shown that, case studies are a popular and effective way of teaching engineering ethics. Engaging students with thought-provoking questions developed from the case studies can foster critical thinking skills and enhance cognitive abilities (Martin et al., 2021).

As discussed by Brunhaver et al. (2021) the students need to be prepared for the realities of the workforce, such as power dynamics, effective communication and negotiation skills, and navigation of complex organizational socialization. This is an area of improvement needed to be addressed during the academic journey of the students is providing the bridge between education and practice. The current research indicate that young engineers believe that they are moderately prepared for engineering work, and the gap closes as they spend more time on their job (Deter et al. 2023). This view is challenged by other research indicating that there is a gap between the perception of the young engineers and their competency skills (Walther and Radcliffe, 2015). As studied in detail by Garcia-Aracil, et al. (2021), practical content coverage and experiences in courses may not only lead to perception of better preparedness for workplace, but also may lead to better development of knowledge and skills. The support and guidance the engineering students receive from their professors may also overcome the issue of not being able to seek support from their mentors and supervisors. Rottmann et al. (2021) highlight not being able to seek meaningful help and support as a significant concern, as the young engineers are expected to have increased autonomy as they perform their work tasks. A recent study stressed the value of timely and constructive feedback, collaboration, confidence in one's work by the supervisors in young engineers' professional development (Klenk et al., 2018). These meaningful inputs are critical for the success of the young engineers. Tying these discussion back to the original point, through impactful and meaningful classroom discussions, the engineering students may be equipped with the tool they need to interact with their colleagues and supervisors, seek support and clarification, and have the ability to navigate the complex situation that may arise as they perform their tasks.

This paper introduces a collection of case studies gathered from interviews with early career engineers, accompanied by thought-provoking prompts designed to foster dynamic class discussions, stimulate critical thinking, and engage all students in ethics instruction. By offering these case studies and discussion questions, we aim to enrich the repertoire of resources available to engineering educators seeking to enhance their ethics instruction. This would also allow the faculty to address some of the concerns that relate to preparedness of the young engineers for the workforce politics and ethics, and enable them to have a meaningful and successful career through being exposed to first-hand accounts of other young engineers, and not hypothetical situations.

Methods

Interviews and Data Processing

This study was approved by the IRB at Colorado State University. Engineers who are within their early years of their careers were invited through e-mail and LinkedIn invitations utilizing the professional networks of the researchers. No incentives were provided to be a participant. Interested engineers were asked to complete a survey on the Qualtrics platform, providing demographic information, for initial screening and eligibility for the study (as this work was mainly focused on early career engineers). The selected participants completed the consent documents to participate in a fully anonymous and confidential virtual interview. The interviews were conducted on the Zoom platform, where the conversation transcript was recorded for research purposes. The interviews were intentionally designed to be semi-structured, giving the autonomy to the interviewees to direct the conversation, and share as much as they preferred. Several of the questions included in all interviews were on ethics training and ethical dilemmas the participants faced. The participants selected their alias', and after the interview was complete, they reviewed the transcript documents to ensure they were comfortable with the information captured there. The transcripts were then uploaded to Atlas.ti for the research team to perform thematic analysis (Braun and Clarke, 2006). The transcripts were coded by the whole research team during meetings to identify and analyze the patterns within the codes. Text related to ethics training and ethical dilemmas were further categorized for sub topics (e.g. impact of deadlines (working under pressure) on ethical practice, conflict of interest due to both performing and inspecting the work completed, lack of formal ethics training at school, lack of guidance for work to ensure proper completion of tasks, physical safety at the worksite, company politics versus personal ethics, conflict between the clients and company (profit)). There were 40 mentions of cases that related to ethical dilemmas, this cases were coded and analyzed and grouped for this study. Case study examples were developed from the first-hand cases shared by the participants, individually, with the ones with more detail selected for this paper.

Demographics of the Participants

The demographic data for 13 participants who were selected and completed the interviews are presented in Figure-1 below, for gender, race, current place of employment, years of professional experience, are field of employment. As can be observed from the pie charts, majority (75%) of the participants identified as male, with 69% reporting their race as white. At the time of the interview, most of the participants (54%) were employed by the private sector, followed by academia (23%) and consulting (15%). Almost half (46%) of the participants had 4-5 years professional experience at the time of interview, about a quarter (24%) of the participants had more than 5 years of professional experience, and the remaining 30% of the participants had varying levels of experience that were less than 4 years. Several of the participants completed graduate degrees, but this data was not specifically collected.

Based on the non-prompted input from the participants, most mentioned having a P.E. licensed supervisor or boss. The ones with more professional experience also discussed P.E. exam preparation and taking courses on ethics to prepare for that section of the exam. A few of the participants were expected to complete an ethics training as they started their positions, however

they indicated that they were not assessed for the successful and thorough completion of that training. A few of the participants discussed challenges of working from home during COVID-19, missing out on the interactions with their colleagues and more importantly their supervisors. They also brought the lack of mentorship due to being away from the workplace. One of the participants relied on their mother to be their mentor, as she was a P.E. licensed engineer. As the participants brought up the ethical dilemmas they faced, most of them indicated that they did not have any formal training on engineering ethics, and the courses they took in their universities (if there was one required for their degree) did not prepare them to handle these situations properly. Most of the participants also reported that transitioning between school to workplace was a major challenge and they wished their studies prepared them to be able to navigate the challenges of the workplace politics and dynamics.

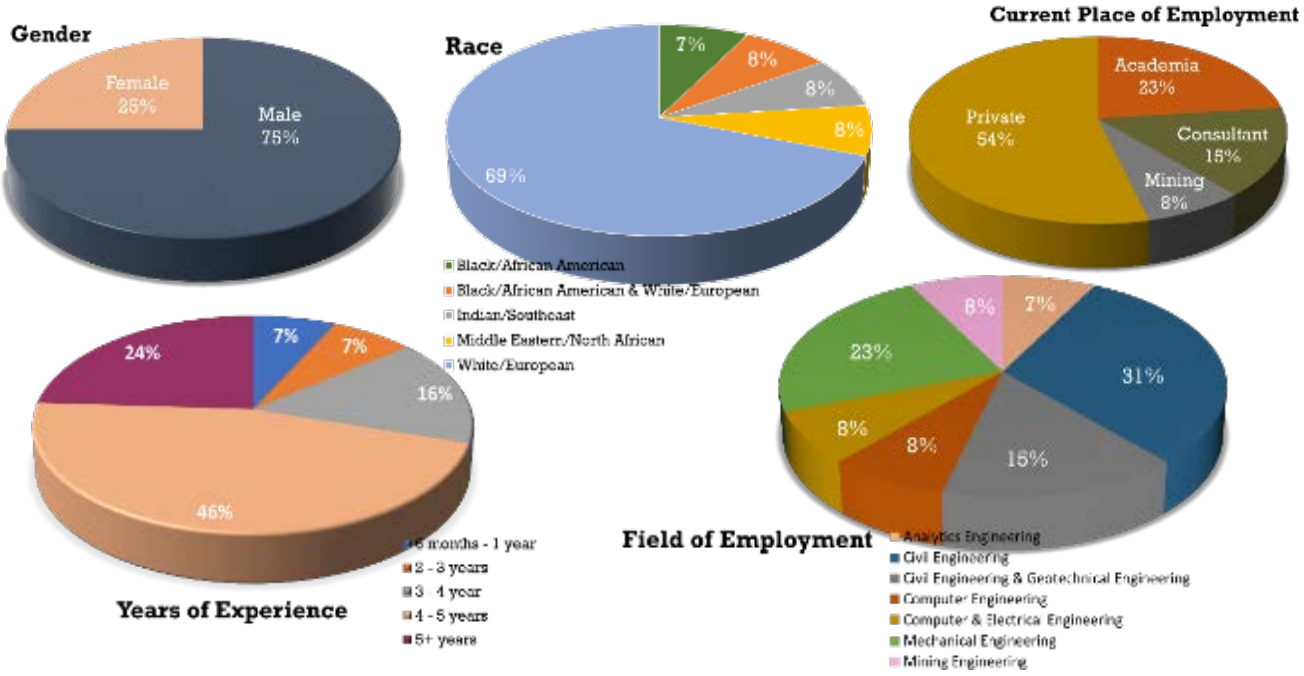

Figure-1: Demographic Data for 13 Participants

Case Studies for Engineering Ethics Instruction and Discussion

We recommend the utilization of case studies, extracted directly from the interviews, to foster a more engaging classroom discussion on ethics, exposing the students to the real life situations young engineers face at their workplace. After a brief discussion on engineering ethics, responsibilities of engineers and codes of ethics, the students may be asked to provide their personal experience with ethical dilemmas at school and during their internships/work. They may be also asked to brainstorm on what kind of ethical dilemmas they are likely to face when they start practicing engineering. Along with these discussions, the students maybe prompted to recognize the expectations and challenges of the workplace through the case studies presented below. Each case study comes with a set of questions to guide the conversation as well as to start the engagement with the dilemma and codes of ethics. The cases may also be presented by the

faculty or by volunteering students, as if they are the ones struggling with the situation, to make them more relatable and impactful. These practical and context-specific dilemmas will allow educators to foster a better understanding of the ethical nuances in engineering practice and prepare the students to navigate the workplace struggles. The educators may ask the students to work in groups, analyzing the case study, answering the questions, and then presenting their judgements with the whole class. Then other students may ask questions to the presenting team to be able to process the situation and what other pieces of information may be needed to come to robust solution or outcome. At the end of the case studies, strategies and solutions would be suggested for the young engineers to navigate the ethical dilemmas.

Case 1

Navigating Safety and Urgency: The Dilemma of a Rushed Grade Beam

ASCE Code of Ethics – Society

a. first and foremost, protect the health, safety, and welfare of the public

i. report misconduct to the appropriate authorities where necessary to protect the health, safety, and welfare of the public

Cesar, a civil engineer, finds himself at a crossroads. Previously, he worked for a design engineering firm known for its steadfast commitment to ethical standards. However, his current position in a construction company presents a stark contrast. The pressure to meet tight deadlines and financial constraints often overshadows ethical considerations. Cesar has a critical project: constructing a hundred-foot concrete grade beam. The clock is ticking, and the pressure mounts. The project manager insists on completing the grade beam in two days instead of the standard three days. This means workers labor relentlessly: 12-hour shifts without breaks. Their health and well-being maybe affected in the process. Cesar struggles with the trade-off: rushed completion of the project versus worker fatigue and safety. In another angle, to meet the tight deadline, materials must arrive promptly. But rushing can lead to shortcuts. What if the grade beam isn't properly installed? The city inspector's visit looms, and Cesar wonders if the inspector will even recognize potential flaws. The pressure to save time clashes with the duty to ensure structural integrity.

Here is his account of the situation: "***Let's use placing concrete, like a grade beam. A hundred-foot concrete beam. And we know that we're taking a risk by making sure it's completed in two days instead of three days. With that risk comes having our workers work more than what they're usually required. So 12-hour days without a lunch break, just nonstop. And then that impacts their overall health to an extent for that day. And then we also take that risk that we're rushing to get material here on time, which can lead to sometimes shortcuts with that. Maybe that grave beam isn't properly installed on time, or it may be. And then you have a city inspector come in and do an inspection where the inspector doesn't even know what he's looking at. You don't think about if it's going to impact someone else, you just worry about time and money in that highest stress environment***."

Discussion Questions:

1. What factors do you believe contribute to the higher emphasis on ethics in design engineering firms compared to construction companies? How might these differences impact decision-making processes? Consider organizational culture, project timelines, and stakeholder expectations.
2. Reflecting on Cesar's concerns about working under pressure in a construction company, how do you think time constraints and financial pressures can potentially compromise ethical decision-making in engineering projects? What strategies can engineers employ to maintain ethical standards while meeting tight deadlines? How can project managers and team leaders support this balance?
3. In what ways might Cesar's worries about prioritizing time and money over ethical considerations manifest in the construction company's projects? What are the potential consequences of such prioritization (on public safety and welfare)? What responsibility do engineers have toward public safety? How can they communicate risks effectively to decision-makers? How can engineers advocate for worker well-being without compromising project timelines?
4. Reflecting on Cesar's experience, what strategies or actions could he take to address his concerns about the potential impact of neglecting ethical considerations on public safety and welfare? How might he advocate for ethical decision-making within his current workplace?
5. What are the broader implications of Cesar's dilemma for the engineering profession as a whole? How can the profession as a collective address systemic issues related to ethical lapses in high-pressure environments such as construction projects?

Other Considerations:

1. Discuss perspectives of the workers, project managers, community members
2. Explore legal aspects of compromising safety and the potential consequences

Suggestions for Cesar: (Educator's Guide)

1. Advocate for Worker Safety and Quality:
    - Cesar can document his concerns about worker fatigue, potential shortcuts, and the risk to structural integrity. This creates a record.
    - Cesar should communicate his concerns to his project manager, emphasizing the potential safety hazards and risks associated with rushing the project. He can reference industry standards and safety regulations to support his arguments.
    - Cesar, along with his colleagues, can brainstorm alternative solutions to meet deadlines. This might involve proposing a more realistic timeline or exploring options for additional resources (e.g., more workers, extended shifts with breaks).
2. Engage with the Inspector:
    - During the inspection, Cesar should be transparent about the rushed schedule and highlight any areas of concern he identified.

3. Seek External Guidance (if necessary):
    - Cesar can explore if his company has an ethics hotline or internal resources for reporting safety concerns. He can also seek guidance from a more senior engineer within the company.
4. Consider Reporting (as a last resort):
    - If Cesar feels his concerns are ignored and the project continues in an unsafe manner, he may need to consider reporting the issue to external authorities. This could involve reporting safety violations to relevant agencies or notifying the client about the potential risks associated with the rushed timeline.

Closing note: While deadlines are important, Cesar's primary responsibility is to public safety. He should not compromise safety to meet unrealistic deadlines and should be prepared to defend his actions if necessary.

Case 2

Navigating Dual Roles: The Ethics of Design and Inspection

ASCE Code of Ethics – Clients and Employers

b. make clear to clients and employers any real, potential, or perceived conflicts of interest

Carl, a civil engineer, finds himself at a crossroads. His involvement in a retaining wall project highlights the an essential balance between design and inspection - a balance that can easily turn into a conflict of interest. Carl designed the retaining walls for a highway project. The project followed the design-bid-build model: design, bidding, and construction. However, a twist emerged. The client hired Carl's company not only for design but also for construction management and inspection.

Here is his account of the ethical dilemma he faced: "***It was a design bid build project. So the designer does the design and then the project goes out to bid, and then a contractor bids on the project, wins the work, and then generally the [client] hires a firm to do construction management and inspection. The intent of the inspection is to make sure all the contract requirements are fulfilled. So on that particular project I did the design of the walls, and then the project went out to bid, and then the [client] actually hired [my company] again to do the construction management and construction inspection. And that could be viewed as [an ethical dilemma] (a conflict of interest) since we did the design and then we're out in the field inspecting the project. And generally it's a good idea to have a separate entity do that design and the inspection is I guess the easier way to say it.***"

As a follow up to this statement, Carl explained how he resolved this issue: "***I think communication to all parties is beneficial in cases, especially the example I gave. So on that retaining wall project, I was invited to do the inspection of the retaining walls that I had designed, and I brought that up with my supervisor that it could be viewed as a conflict of interest, and they communicated that with the [client], and they ended up putting somebody else on the project as an inspector. So communication is paramount to resolve issues and to***

prevent them from happening. And to [my company's] defense, there's a lot of consulting engineering companies in the industry that work on both the behalf of the owner and behalf of the contractor. And that's where issues can arise on most projects really."

Discussion Questions:

1. How do you perceive the ethical dilemma described by Carl in his involvement with both the design and inspection of the retaining walls project? What ethical considerations are at play in this situation? Could he objectively evaluate his own design? Would he prioritize the project's success over impartial inspection?
2. Carl mentioned that his company commonly works on behalf of both the owner and contractor in consulting engineering projects. What are the ethical implications of such dual roles, and how might they impact the integrity of project outcomes? Can a firm truly advocate for the owner's interests while also representing the contractor? How might this impact project outcomes and public trust?
3. Reflecting on Carl's decision to communicate his concerns about the potential conflict of interest, what role do you think effective communication plays in addressing ethical dilemmas in engineering projects? Carl emphasized the importance of proactive communication in addressing and preventing ethical issues. How can engineering organizations foster a culture of transparency and accountability to encourage open dialogue about ethical dilemmas among team members?
4. How do you think Carl's resolution of the conflict of interest reflects on his professionalism and commitment to ethical conduct as an engineer? What alternative courses of action could he have taken to address the issue?
5. Reflecting on Carl's account, what lessons can engineering students and professionals learn about recognizing and addressing conflicts of interest in their practice? How might this case study inform ethical decision-making and professional conduct in similar situations?

Other Considerations:

1. Carl's ability to effectively communicate his concerns shows maturity and the transparency prevents ethical pitfalls. His professionalism and understanding prioritized ethical conduct over convenience.

Suggestions for Carl: (Educator's Guide)

1. As Carl effectively demonstrated, open communication is paramount. Carl did well by bringing the potential conflict to his supervisor's attention. This allows for a proactive approach to addressing the issue. The supervisor's communication with the client ensured transparency and helped mitigate the potential conflict. Informing the client allows them to make informed decisions and potentially choose a separate inspection firm.
2. When possible, advocating for a clear separation of design and inspection teams within the same company can help reduce potential conflicts. Companies can develop clear policies addressing conflicts of interest. These policies can outline procedures for identifying and mitigating potential conflicts, such as assigning different teams within the

company for design and inspection or disqualifying themselves from inspection of their own designs.
3. Even if Carl's company remained as the inspector, it's essential to maintain objectivity and prioritize the project's integrity over any desire to approve the initial design.

Closing note: By following these strategies, engineers like Carl can promote transparency and ethical conduct within their companies, ensuring projects meet safety standards and public trust is maintained.

Case 3

Balancing Billable Hours: The Ethical Tightrope

ASCE Code of Ethics – Peers

d. promote and exhibit inclusive, equitable, and ethical behavior in all engagements with colleagues

Kaylee, a civil engineer, faces a common workplace challenge: accurately recording billable hours. Her supervisor's pressure to falsify time entries raises ethical concerns. Kaylee works on a billable project. She invests extra time to ensure quality and precision. However, her project manager (PM) suggests charging the proposal number inaccurately to hide budget overruns. The PM fears scrutiny from higher-ups. Kaylee faces a dilemma honesty versus budgetary pressures. Her performance evaluation and career prospects hang in the balance.

This is her account of the situation: "***I think the biggest thing that I probably see is when you're working on something that's billable and maybe you spent more time on it than you should have, then the PM would rather you charge the proposal number to not show that we went over budget, just so that their manager doesn't know that they didn't properly handle a budget so that it's not reflected in something that they would have to justify. They can try to go to the client and ask for more money before having to have a discussion with their manager. So that's always weird, especially since I guess not at lower staff level, but once you get further in your career, a lot of your performance is based on what you're doing billable and what you're doing unbillable. So then as a younger staff, you're like, "I hope it doesn't look like I'm doing training all the time when I'm doing actual work, but it just went over budget." So that's one of the big things I think about a lot, especially since if it reflects in our performance, then it's like now me having to do this because a higher up person told me too is reflecting on my performance for my bonuses and raises and things like that. I'd say that's the most common one I've seen.***"

Discussion Questions:

1. Reflecting on Kaylee's experience, how do you think her supervisor's pressure to inaccurately record billable hours reflects on the organizational culture and ethical standards within the engineering firm? What steps can organizations take to foster a culture of honesty and integrity in financial reporting practices?

2. How might the project manager's directive to Kaylee to inaccurately record billable hours impact her trust in organizational leadership and her perception of equitable supervision? What ethical responsibilities do project managers have in ensuring fair and transparent practices within their teams?
3. Kaylee expressed concerns about her performance evaluations and career prospects being tied to billable hours and project budgets. How can organizations ensure that performance metrics accurately reflect employees' contributions while promoting equitable evaluation criteria that prioritize ethical conduct and quality of work over financial metrics?
4. Consider the potential consequences of complying with unethical directives from supervisors, such as compromising one's integrity and professional reputation. How can engineers navigate conflicts between loyalty to their employers and their duty to uphold ethical standards in the workplace?
5. How can engineering organizations foster a culture that values ethical conduct and encourages employees to raise concerns about unethical practices without fear of retaliation? What role do organizational leaders play in promoting ethical decision-making at all levels?

Suggestions for Kaylee: (Educator's Guide)

1. Kaylee can directly and respectfully address the issue with her project manager (PM). She can explain her discomfort with falsifying time entries and emphasize the importance of accurate records.
2. Kaylee can suggest alternative solutions, focusing on the project's needs. Additional resources or revised timelines can address budget overruns without resorting to unethical practices.
3. Kaylee may seek guidance within the company. Many companies have internal resources for reporting ethical concerns. This might be a compliance hotline, an ethics officer, or a supervisor higher in the chain of command.
4. It's important for Kaylee to keep a record of all communications and events related to this issue. This includes documenting the PM's request, her attempts to address it, and any communication with internal resources or others.
5. If the situation remains unresolved and falsification of billable hours continues, Kaylee may need to consider a difficult decision. This could involve escalating the issue to a higher authority or even seeking a new position within a more ethical company.

Closing notes: While career advancement is important, compromising one's ethics is not worth the risk. Future employers may conduct reference checks, and a history of unethical conduct could jeopardize future opportunities. Falsifying time entries can have long-term consequences beyond one's individual situation. It can lead to inaccurate project data, poor resource allocation, and ultimately, compromised project quality. By following these strategies, Kaylee can protect her ethical standing, promote transparent record keeping, and advocate for a more ethical work environment. If escalation becomes necessary, the documentation she maintains will be crucial in supporting her position.

Case 4

Balancing Mentorship: Navigating Unequal Workloads

ASCE Code of Ethics – Peers and Profession

g. supervise equitably and respectfully;

e. promote mentorship and knowledge-sharing equitably with current and future engineers;

Spencer, an environmental engineer, discussed issues with mentorship and supervision at his workplace; he is struggling with the uneven distribution of mentorship and supervision. As he trains younger engineers, he faces challenges arising from workload pressures. He also observes disparities in mentorship, where some colleagues receive ample guidance, while others struggle silently on their own.

He explained this situation as follows: *"**I would mostly just say that the level of mentorship hasn't been equal across the board and not necessarily purposeful. A lot of that has ended up being just from partly workload and having time to mentor and train people. And then otherwise, just knowing when people need help. So I had one old coworker who just, he never asked questions, so we didn't know that he needed more help than he was getting. But then right now I've been working on training one of our younger engineers, but I've had to push back training several times, just purely from a workload standpoint. As important as I think we need to train them up sooner rather than later, our clients and their deadlines aren't really understanding of, "Oh, why didn't you work on this right now?" type of thing."***

Discussion Questions:

1. Reflecting on Spencer's experience, how do you think unequal levels of mentorship and supervision impact the professional development and job satisfaction of engineers in the workplace? What ethical responsibilities do employers have in ensuring equitable access to mentorship and training opportunities for all employees?
2. Consider the ethical implications of assuming that employees who don't ask questions do not require additional support or mentorship. How can organizations create an inclusive culture that encourages open communication and proactively identifies the needs of all team members?
3. How might the lack of sufficient mentorship and supervision contribute to potential risks in project delivery, such as errors or quality issues? What steps can organizations take to mitigate these risks while still meeting client deadlines?
4. Reflecting on Spencer's account, what strategies or ethical frameworks could guide engineers in advocating for adequate mentorship and supervision within their organizations? How can engineers effectively communicate the importance of investing in staff development to organizational leadership?
5. How can engineering organizations foster a culture of continuous learning and mentorship, even in environments where workload pressures are high and client demands

are demanding? What role do leaders and managers play in prioritizing employee development alongside project delivery?

Suggestions for Spencer: (Educator's Guide)

1. Spencer can communicate with his supervisor about his workload and the challenges it poses for mentorship. Perhaps delegation or adjusted deadlines can free up time for mentorship activities.
2. Spencer may also explore the possibility of establishing a peer mentorship program within the department. This can distribute the mentoring burden and allow Spencer to focus on specific areas while colleagues with lighter workloads can offer additional guidance to newer engineers.
3. Spencer may invest some time or collaborate with his colleagues in developing basic training materials or resources that newer engineers can access independently. This can answer common questions and reduce reliance on constant one-on-one supervision.
4. Spencer can encourage newer engineers to take initiative and approach him with specific questions when they encounter challenges. This fosters independent learning while ensuring they receive necessary support.

Closing note: By following these strategies, Spencer can contribute to a more equitable and supportive work environment for his colleagues while maintaining his own workload. His efforts can pave the way for a culture of knowledge-sharing and professional development within the company.

Case 5

Navigating Competence: When Expertise Reaches Ethical Boundaries

ASCE Code of Ethics – Clients and Employers

f. perform services only in areas of their competence

Fred, a geotechnical engineer, used to work for a consulting firm. His experience there highlights the importance of recognizing limits and seeking guidance. Fred's supervisor had approached him with a project proposal that involved analyzing soil stability for a high-rise building construction in a region prone to seismic activity. He realized that the project requirements far exceeded his expertise and experience in geotechnical engineering. He had the insight to talk with his supervisor about his concerns.

Here is the full story based on Fred's input: "***so my experience working as a consulting engineer back at [his company], really had to do with making sure the work you were doing was within the scope of your ability and making sure that you understood the tasks that were presented to you and you were creating designs and creating work that was accurate within the scope of your abilities. You weren't taking on work that was beyond your practice and making sure that you were finding the right people to ensure that what you were producing was accurate and reflective of the true designs and what the company wanted to put forth. In***

terms of a specific case, I can't think of one off the top of my head, but just being able to turn down work by saying, I'm not qualified to be doing this. I don't have experience doing this before. I either need somebody to walk me through this or have somebody else do this work for me because I don't have experience with this. Recognizing those limits I think was the most ethical dilemma that I ran into. But I think it really falls on the responsibility of the individual engineer to know what you're capable of doing and what you have experience doing. And then most companies that I find here, they're not going to push you to do something you're not comfortable with. They're going to work with you, but it's up to the individual engineer to say, "I can't do this" and "I need help," or "I need somebody else to do this for me. ””

Discussion Questions:

1. What are the potential consequences for Fred and his firm if he had chosen to accept the project despite his lack of expertise in seismic analysis?
2. How might Fred's decision impact his reputation and relationships within his firm and the broader engineering community?
3. In what ways can engineering firms promote a culture of ethical conduct and encourage employees to acknowledge their limitations and seek appropriate assistance?
4. Discuss the role of continuing education and professional development in ensuring engineers' competence and ability to perform services within their areas of expertise.
5. How can Fred's experience serve as a learning opportunity for other engineers facing similar ethical dilemmas in their careers?

Suggestions for Fred: (Educator's Guide)

1. Fred effectively demonstrated, open communication is important and can lead to proactively addressing any ethical concerns. He did well by discussing his concerns with his supervisor. This allows for a collaborative solution and protects the project from potential inaccuracies.
2. If Fred felt comfortable taking on the project with additional support, he could explore resources within the company. Perhaps a senior geotechnical engineer could mentor him or collaborate on the project, ensuring expertise is brought to the table.
3. In some cases, involving external consultants with specific expertise in seismic activity may be the best course of action. This ensures the project is completed to the highest standards.
4. By acknowledging his limitations, Fred protected his professional reputation. Taking on work beyond his expertise could lead to errors with potentially serious consequences.
5. Fred's situation highlights the importance of continuous learning. Staying updated on the latest advancements in geotechnical engineering can help him expand his expertise and potentially take on similar projects in the future with more confidence.

Closing note: By following these strategies, Fred can ensure his work is conducted ethically and competently, prioritizing project success and public safety. His actions also set a positive example for colleagues within the company.

Acknowledgement

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