

Can you feel it? A case for reflexive response and imagination in ethics discussions [Theory Paper]

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Abstract

This paper makes a case for the importance of moral imagination in ethics instruction. Incremental imagination exercises can effectively include important components of real-life ethical decisions, including the inner conflict between reflexive and cognitive responses during the decision process and perspectives that differ from personal experiences. Ethics discussions can be enriched through stretching a student's capacity to imagine increasingly distant situations and perspectives while accounting for a variety of possible outcomes and impacts. It is important to make the imaginative leap incremental so that students can relate to and imagine themselves in the scenario. This differs from some instruction methods by incorporating reflexive responses, divergent thought processes, and an understanding of an individual's decision process. Examples are provided that relate student experiences to future decisions, demonstrate how experience and time can affect decisions, and show the impacts of perspectives and decision processes on ethical decisions.

Introduction

There is often a disconnect between how ethics is presented in academic settings and professional development seminars, and how engineers encounter ethical decisions in everyday engineering practice. One limitation with the dominant practices in engineering ethics instruction is the lack of attention to the broader organizational and societal context that has been addressed in several exemplar studies [e.g. 1, 2]. Another limitation is the underemphasis on ways by which we engage in ethical decision-making in real world. The process of moral deliberation and addressing ethical problems have often been narrowed to employing principles and rules, which at best rely on calculative and product-oriented reasoning. What is missing then is the central role of imagination in moral reasoning.

Moral imagination has been proposed as a critical element of moral deliberation [3] and a goal of ethics instruction [4, 5]. More recent support for prioritizing imagination in ethics instruction has been provided by Jalali and Matheis [6] and Jalali and Civjan [7], which presented theoretical background and application to class instruction. Within engineering education literature the role proposed for imagination has often been limited to "what-if" scenarios where one imagines a range of possible outcomes from different decisions one could make in a point in time. The authors posit that this is too narrow and misses critical elements that can be gained from imagination exercises. Once one can frame a scenario in terms of outcomes resulting from decisions, one can also imagine oneself in the position of other stakeholders in the process, not merely attributing cost-benefit to their position, but actually imagining oneself being affected by the decision. The process of moral deliberation is also about reconstructing selves, our thoughts, and habits [3]. The ability to imagine oneself in a different role is important in realistic evaluations of scenarios that may include envisioning a future self, such as a student seeing themselves in an entry level engineering position, or that engineer seeing themselves in a management position. When reflecting on a scenario one has been in and the relations to a scenario that has not been experienced, the discussion can be much richer and include emotional responses as well as rational evaluation of the novel situation. Many moral theories include these

two responses being in conflict during an ethical decision process, especially in the case of an ethical dilemma (where all possible solutions require transgressing a moral principle).

The objective of this paper is to discuss how ethics instruction can effectively bridge this gap through including responses that are reflexive/reactionary as well as cognitive/rational, and by practicing incremental imagination exercises. Case studies will be presented with different perspectives on how they could be presented.

Imagination and Reflexive Response in Ethics Instruction

If instruction only develops the rational components of ethical decisions a person may be ill-prepared to resolve the inner conflict that occurs in a real-life ethical decision. Only through developing imagination skills can one include both reflexive/reactionary and cognitive/rational components when discussing scenarios that differ from personal experiences, thereby preparing one to make ethical decisions when these new experiences are encountered. Some clarification of this inner conflict is worthwhile. Emotional response in an ethical dilemma is complex and includes physical responses including anxiety, stress and resulting physical changes such as heart rate. We will term these reflexive/reactionary responses and use the term “reflexive” as a broad and inclusive term. This could be correlated with “gut feel” reactions and responses, but also to the emotional and physical “pangs” that accompany not being completely sure that the right action has been taken. “Cognitive” will be used to describe the rational process of evaluating a situation independent of these reflexive responses.

Imagination provides understanding of others one interacts with when making decisions [8]. It would be impossible to adequately consider the world outside of ourselves and our direct interactions until we can see others as complete beings and understand social constructs as that we actively interact with in our world, rather than a series of attributes that we merely analyze. This is equally valid for imagining a whole person rather than individual attributes [9], imagining ourselves in other situations, imagining other perspectives, and imagining our and other selves in future conditions. The concepts have been extrapolated to connect “inner world” and “outer world” in fields such as liberation theory and praxis [10, 11, 12, 13], where a basis of some scholars is that until one can fully imagine a different world it is impossible to understand how to enact the changes necessary to realize that world.

The power of imagination can be used to incrementally stretch our understanding to other persons, other situations, other societal relations, and other points in time. When considering scenarios outside of our current being we often lose the reflexive component of the decision since we cannot fully imagine ourselves in the process. As a considered scenario becomes further removed from our current personal condition the powers of imagination must be more fully realized in order to break down our personal perspective and implicit biases that would otherwise dominate our understanding. It is unrealistic to expect a person to suddenly grasp and fully imagine conditions completely different from their personal experiences. Therefore, incremental imagination exercises can be helpful to stretch a person’s capacity to imagine more distant situations as well as other perspectives and possible outcomes. While there will always be some assumptions and implicit bias in imagined scenarios, the more fully embedded the imagination is in the scenario the more likely that considerations of other perspectives and actual decision

processes can be included. One must engage in the scenario to the point where both reflexive responses and cognitive thought process are invoked.

The ways that ethical decisions are made can differ among individuals, by an individual at different points in time, and depend on the time frame required to make a decision. Some general concepts of the decision process include Kohlberg's stages of moral development [14], Social Intuitionism [15] and the Dual Process Theory [16]. Simply stated, the former relies on cognitive evaluation of a decision, with a person's moral development stage influencing that decision. Stages progress from focusing on one's own needs, through conforming to conventional norms and institutionalized rules, through prioritizing societal needs, and ultimately focusing on a higher moral conscience. Social Intuitionism [15] is based on decisions being based on intuitive and reflexive responses that are based on emotions rather than rational thought, and these responses are modified over time through cognitive reasoning. Dual Process Theory allows for the interaction of these two processes, allowing for a dialogue between an intuitive reaction and the slower rational processes. Pfeiffer and Billiar [17] note that different well-developed ethical theories can result in equally valid opposing ethical decisions. If one allows that different people may arrive at a different decision depending on which decision processes are dominant, that a longer time allowed for a decision could result in more developed cognitive process or more dialogue between the cognitive and intuitive processes, or that they may be utilizing a different ethical theory, the basis for absolutes in the discussion of ethical decisions becomes less compelling.

The 2020 revision to the ASCE Code of Ethics [18] prioritizes stakeholders in descending importance as society, the natural and built environment, the profession, clients and employers, and peers, somewhat paralleling Kohlberg's stages of moral development. There is no mention of self as a stakeholder, implying that personal needs should not be considered when making an ethical decision. However, when one recounts an ethical conflict one has encountered, it is not as if we can withdraw ourselves completely from the decision. Our perspective of the impacts of a decision are rooted in our personal experiences, relationships, and assumptions about stakeholders. On top of this, our reflexive response may conflict with our cognitive response and result in rationalizations about the decision. Removing self when cognitively analyzing a case study may be possible, but is problematic when faced with an actual ethical conflict.

From an instructional perspective, we should also be wary of making large imaginative leaps, or making assumptions that a student can quickly learn and apply an unfamiliar ethical framework to a scenario and come away with learning that will change their future behavior. Prince and Felder [19] point out that any teaching method that requires a sudden change in a student's cognitive model will not be effective. Instead, they recommend continuous revisiting and reformulating of a student's cognitive models. Similarly, incremental imagination exercises can be used to develop a student's cognitive and reflexive understanding.

Pitfalls in ethics instruction

Discussing ethics instruction in a broad sense is a difficult endeavor, as there are many ways in which ethics can be approached in the curriculum. Options can include individual modules on ethics within introductory and capstone courses, embedding ethics throughout a series of courses

within the curriculum, or requiring ethics specific courses. Ethics components can be taught by faculty within the engineering discipline or by instructors with specific backgrounds in ethics instruction. In addition, the pedagogy involved in ethics instruction can vary widely. Some approaches include in-depth readings in philosophy to understand ethical decisions, others focus on professional ethics codes of conduct and professional case studies, and others focus on fictionalized accounts of ethical dilemmas. Some programs include combinations of many approaches, while others define ethics instruction narrowly. Making evaluation of ethics instruction even more difficult is the influence of the instructor and student body on the effectiveness of learning, regardless of syllabi content and materials used. The two authors of this paper have very different backgrounds in ethics instruction and engineering education and incorporate very different approaches to include ethics instruction into the curriculum. Despite this, there are some commonalities, specifically the use of imagination exercises to incrementally develop scenarios that students can internalize, relatable discussions to allow for reflexive as well as cognitive aspects of responses, and awareness of the ethical decision process.

Regardless of the approach, it is important to untangle ethics, morals, and legal components of a scenario so they are not confused [20, 21]. By focusing on Codes of Ethics [18, 22], court cases, or case studies with known outcomes we inherently focus on minimum standards and penalties, rather than the decision process underlying ethical judgment. This can be problematic if it appears that merely meeting the letter of the law, or annotating behavior according to individual canons of a code, are all that is required for upholding ethical standards. These discussions can sidetrack into whether someone would receive a harsh penalty rather than whether they acted ethically. It can also focus the ethical decision on self-interests (will “I” be penalized) rather than on the effects on all stakeholders and how those effects were accounted for.

Other instruction approaches use ways to engage students by focusing on heroic actions, fictional approaches, or catastrophic events. These inherently present ethics in a way that prevents participants from fully immersing themselves in the decision due to the imaginative leap required, missing the reflexive component of ethical decisions. The focus is instead on cognitive discussion of a scenario, which only captures part of the process and perhaps avoids the component of an individual’s decision process that can be most effectively modified, namely how one resolves internal conflict between the reflexive and cognitive. When one recalls a difficult decision there is often a logical explanation of why that decision was made, but also the emotional pang of remembering the accompanying worry of whether the correct decision was made and possible effects to the self. This defines the cognitive and the reflexive aspects of a decision. With the passage of time, we often reflect more on the justifications and rationalizations of the former and minimize the influence of the latter in our recollections.

A difficulty in incorporating ethics instruction into an engineering curriculum involves the convergent thinking basis of the engineering curriculum itself. The early core classes tend to deal with fundamental concepts that are presented as absolutes and students are expected to use the appropriate equations and variables to arrive at the correct solution. Even when instructors spend time to explain the assumptions and simplifications inherent in these methods and solutions, the grading and textbooks are too often focused on arriving at an absolute “correct” answer. Even when discussing decision making skills, we may talk about decision trees and appropriate weight of each category, but these are rarely approached from different perspectives, instead focusing on

the designer's judgment or set values that should be used. These are not incorrect approaches to teaching these subjects, though they can be inherently misleading with regard to qualities that distinguish an excellent professional engineer. It is not until students take their design classes and electives that discussions include the multiple options available in completing a design, but these are then often curtailed in assignments to limit the range of options to be graded. Some design classes and textbooks still approach problem solving as a set of known "givens" and constraints, such that only one answer is "correct" and is arrived at through a completely rational process. Other classes encourage wide ranging discussions and allow students to make assumptions and arrive at their own solutions to complex problems, building on the fundamentals of earlier classes. It is less common, and perhaps discouraged, for students to be asked to arrive at multiple equally valid design solutions and decide which to use, or to take the perspective of a non-designer to influence a design decision. It is therefore no surprise that engineering ethics instruction is often dependent on applying standards or principles rather than promoting one's previous experiences, broadening understanding of an ethical situation, and simulating different alternatives. The divergent thinking that is needed to address ethical decisions is not promoted in the majority of the engineering curriculum. Therefore, the introduction of divergent thinking can be met with resistance, especially if it is not related to and integrated into the engineering curriculum. If it is perceived as a different field, then students may not understand that studying their ethical decisions will relate directly to their careers. To combat this, some instructors approach ethics from a convergent (cognitive) perspective and/or engage students by grabbing their attention (heroic actions, catastrophic events, fictionalized scenarios) that may not be as effective at changing behavior due to taking too large of an imaginative leap.

Preparation for ethical conflicts makes one more likely to act ethically [23], but most ethical decisions engineers face in practice are far more common and mundane than implied by case studies [24]. Therefore, it is often recommended to supplement case study instruction with ethical instruction that is more closely tied with course content and everyday decisions [17, 25, 26, 27, 28, 29]. Failure to address these every day decisions may promote ethical fading, where these smaller decisions are not seen as ethical issues.

Ethical decisions are also compounded by issues of biases (including biases of cognitive, conformity, confirmation, implicit, overconfidence, self-serving, tangible) that we are likely not aware of and students are ill prepared to acknowledge in the absence of further instruction on these topics. They may also be oblivious to the effects of incrementalism on ethical decisions that can result in either strengthening of ethical standards or sliding into unethical behavior over time due to ethical blind spots and ethical fading. In the latter cases an unethical decision would not be a conscious lapse, but a failure to consider an ethical component when making a decision.

Therefore, when discussions of ethical issues are introduced into classes, much less ethical dilemmas, it can be difficult for students in an engineering curriculum to transition to discussions of multiple equally valid outcomes based on their curricular experiences that focus on convergent thinking, as well as their not having been exposed to concepts of bias, incrementalism, and ethical fading. It is proposed that effective ethics instruction requires students to acknowledge multiple possible solutions to an ethical conflict, and to engage students in both the cognitive and the reflexive aspects of a decision. The latter requires them to be able to

truly imagine themselves in the scenario as a future action that they could be taking, and to engage both divergent and convergent thinking strategies.

A case against moral authority in ethics instruction

With the limited interactions during an undergraduate engineering curriculum, it is not expected (nor should it be) that students will change their views on morality through a class or two. Therefore, what is the intent? A focus on making better decisions through being aware of decision processes, other perspectives, biases, and then have them practice resolving internal conflict during the decision can prepare them for growth in their ethical decision processes. By cognitively evaluating Codes of Ethics and how each decision impacts “others” (individuals, organizations, environment, society, etc.) they can understand societal goals. If an individual is practiced at making the best decision they can in each situation, and can imagine and rehearse scenarios that they could encounter in the future, then there is a high likelihood of making a sound decision in any situation.

If the goal is placed on process, with acknowledgement that different individuals, cultures, or a person at different points in time could make different decisions, then the concept of a “correct” solution becomes moot. To be clear, this does not mean that all decisions are equally valid, or that moral relativism is the goal. Instead, the goal is to make ethically sound decisions and strive to always improve this process, with specific end goals (of which Codes of Ethics can define a lower bound). The case was made earlier that ethical decisions are not absolute, but can be affected by decision process and ethical theory. This will be expressed further in the examples presented.

Implementing imagination into the classroom

In order to have students internalize a scenario requiring an ethical decision they need to be able to fully imagine themselves in the situation. Failure to engage a student at this level foregoes the reflexive aspects of understanding the conflict and puts it squarely in the cognitive domain. This results in linear thinking about the scenario and search for the “correct” answer, rather than acknowledging inner conflicts that can influence the decision, as well as the constraints of outer conflicts, perspectives, and range of possible outcomes. It is proposed that starting with examples that students have direct experience with and extrapolating these to other scenarios can be effective – so long as the imaginative leap is not too large and the parallels can be intuited. By using these incremental steps rather than large leaps students are more likely to live in the moment of the conflict and evaluate the inner turmoil that would need to be addressed when faced with an actual ethical dilemma. With each incremental imaginative leap, the students can see themselves in an alternate role and accept relational identities that are increasingly removed from their personal experiences. Bringing them from the immediately relatable to their future self and other perspectives is the goal of these exercises. At the same time, imagination should be practiced to include an increasing range of possible decisions and the wide ranging impacts of these decisions.

Keeping it relatable: For instance, catastrophic case studies are often presented in the literature as examples of “classic cases” of ethics in the profession. One such example is the Challenger

Space Shuttle O-Ring Problem [29, 30, 31]. This case study is very layered and interesting, with conflict between engineering and management priorities, perceived risks, chain of command and institutional culture issues. Lynch and Kline [26] specifically note problems with the simplifications that often accompany the Challenger explosion case study, which can minimize the overall culture of decision making over time and conflicting roles of individuals which played significant roles in the tragedy. However interesting this case is, it is very difficult to put oneself in the situation and understand the pressures imposed by making decisions in real time while the world is watching, understand the dynamics of NASA and government political oversight on decisions, and to remove the bias of knowing that the decision ended in a catastrophic failure. By not being able to fully imagine oneself in the scenario and knowing the tragic outcome, the discussion invariably becomes an academic exercise of cognitive evaluation where assumptions and relationships must be taken at face value as given. These shortcomings can fail to engage students to the point of affecting their future decisions, despite the interesting discussions that entail. The importance of focusing on relatable ethical issues rather than catastrophic case studies and importance of including social context of ethical conflicts, such as organizational structure, have been noted in discussions of case studies in ethics instruction [2, 29].

Even jumping into a scenario where the student is expected to take the perspective of an experienced engineer making decisions can be too large of an initial leap. Rather, it is essential to first tie issues directly to their lived experience. Some students may have internship experiences, and by sharing issues they have encountered other students can directly see themselves in those situations as well.

Students and early career engineers often face ethical challenges related to over-riding decisions of others, such as during site inspections and supervisory tasks, or in office work where they may not have the engineering experience to fully understand the impacts of a decision. Just as ethical perspectives can change through the gathering of additional information relevant to the decision, they can change over time as an individual gathers experiences that are relevant to future decisions. Experiences or time that provide additional information can be used to modify a perceived risk. These experiences can apply to perspectives of a different person in the same situation, or to the same person at a different point in their career. So, the ultimate decision to an ethical question can change with time or with experiences. This does not mean that experience leads to more ethical conduct. In fact, experience can also lead to incrementalism and ethical fading, resulting in less ethical choices. Experience can also uncover new ethical dilemmas that a less experienced person would not even consider, or awareness of legal advice that conflicts with provisions in a professional Codes of Ethics.

The following examples illustrate how this could be accomplished. The focus is on structural engineering topics, but parallels can be found in all fields. These are not meant to be exhaustive, nor as a guide for what must be included, but are intended to provoke discussion and awareness of intent when addressing ethics and incorporating imagination exercises.

The influence of the here and now: An example used in class by the first author has asked students to reflect on two cases. First, consider a class where a take home exam is given, where student notes and text are allowed as resources but all other information is prohibited. In taking

the exam, the student reaches a problem that does not appear to have been covered in the class materials. They work the rest of the exam and come back to this problem, and ultimately decide to look on-line where they find a similar topic, complete with worked examples paralleling the question on the exam. The student reads the material to verify it makes sense, and then follows the work in the example, modifying the numbers as appropriate for the actual problem in order to complete the exam. The student presents this work as their own. Next consider an engineer working in a consulting company and their supervisor asks them to design a type of structure they have never designed before. They cannot find anything similar in their reference materials. They look on-line and find spreadsheets posted to a civil engineering focused web page by someone at another company as an example of how to design this type of structure. They use the spreadsheet and modify the numbers as appropriate for their structure, checking that the calculations make sense. They present this work as their own to the supervisor later in the week.

It is insightful to see the justifications students provide for why one or the other situation is more of an ethical violation. Depending on past experiences (such as having or not having an internship) some students abstractly associate potential catastrophic outcomes with the consulting environment and can be much more accepting of the student situation since it is relatable to their everyday experiences. They can provide justifications for why the student may have felt compelled to use non-allowed resources, but struggle to accept that it would be appropriate for a practicing engineer, even when the materials are posted as a public record. By pointing out the peer (students and colleagues) and supervisor (boss and instructor) pressure similarities, and that the engineer was using shared resources that were allowed, awareness is raised on how familiarity and experiences influence the way that one approaches an ethical discussion. Asked whether they would turn in someone who they observed cheating on the exam often unveils reflexive responses of not wanting to tell on a friend, questioning whether it is their responsibility or purely between the student and instructor, and personal reflections on whether the student could infer that the instructor would expect them to use on-line materials and how their grade would compare if they did not also use on-line resources. This discussion can then be transitioned to talking about similarities in workplace environments where someone may appropriate a competitor's design through unethical means, and how all of the student experiences could have parallel reflexive responses in a consulting environment. There are many other directions this discussion can take in having students reflect on the two scenarios and possible variations, perhaps led by insights from students with internship experiences.

The influence of experience: Once students can begin imagining themselves in a consulting environment, other scenarios with incremental imagination leaps can be provided. Many students with internships may be able to relate to site inspections, OSHA regulations and personal safety equipment requirements and violations (hard hats at all times on a construction site, masking to avoid dust inhalation when working with concrete, masking requirements in times of Covid-19, observation of open trenching without proper support, etc.) Students can often produce reasons why some of these requirements seem difficult to follow in specific situations and why they think that some leeway in requirements are justified. This can be followed up with examples of violations that resulted in serious injuries or penalties, pointing out how these justifications may seem completely acceptable until an incident occurs. Hindsight can be used to show ethical violations in situations that students had justified in everyday or unique situations. This can lead to discussions of incrementalism, and how slow, imperceptible changes in behavior can occur

over time and lead to unethical practice. If there is some violation of practice that is allowed once, is that acceptable, and how is it clearly communicated why that specific situation is unique and not allow people to think that it is a generally accepted practice?

Once students can imagine themselves in future positions, imagination can be used to put oneself into perspectives with different experiences. Many interns may have been in a situation where they observed inspection responsibilities on concrete delivered to a site and many other students may have experience mixing concrete. Consider a scenario where the fresh concrete tests (slump, air content, etc.) show a mixture that is out of specification for the project. Assume that the sample was taken from the middle of the load, so much of the concrete has already been placed. The driver and contractor say that the next trucks will be corrected, that this is typical, and that this concrete should be placed rather than rejecting the truck or removing any concrete. From an inexperienced engineer or intern perspective, one might feel at a disadvantage, with the contractor and workers at the site have significantly more experience. From this perspective, they might have very limited information, knowing that the specification is meant to ensure “safety to the public” and that the higher slump concrete will be weaker but might be a way of making it easier to place or less expensive to produce. This could lead to assumptions that the out of specification concrete is due to unethical behavior based on contractor priorities. Therefore, it would make sense to reject the truck based on this understanding of the situation. Alternatively, if a senior engineering supervisor was contacted they may over-ride this decision and determine that the delivered concrete is acceptable. This could bring up an inner conflict between the intern, the supervisor, and the contractor. The intern could wonder what they are missing, or assume that the decision being over-ridden absolves them from responsibility for the decision. Without any further guidance, they might assume that the specifications are generally too conservative or arbitrary, and extrapolate that any future truck with this deviation is acceptable. If this becomes normal practice on a job, a senior engineer in the company may be surprised to be told that the inspection protocols are not being followed with the rigor they expected.

However, experience may provide insight into other reasons for a decision to accept the concrete. One might ask if a high range water reducer added, where the concrete is being placed, how critical are the members being cast, did previous strengths exceed requirements? A senior engineer may know the answers to many of these questions, or be able to quickly get this information before making the decision. They may accept or reject the truck based on this additional information and knowledge of why this is relevant information, or divert the concrete to a less critical member. By imagining oneself as the supervisor you see that there is a lot more information at your disposal to make the decision and evaluate the risks. However, the amount of additional information that can be collected is dependent on the window of time available to arrive at a decision. So, even this experienced engineer may arrive at a decision to accept, or reject, the truck. Most importantly, the ethics of the problem relies less on the final decision in the scenario, and more on the process of arriving at the decision and perspective considered. Sometimes student experiences can be brought to the discussion, including extracurricular experiences, or even the consistency of measurements in laboratory classes.

Similar discussions can examine design decisions and relate directly to material in senior design classes. Consider an inexperienced engineer who understands that the life safety provisions of AISC and ACI design specifications rigidly represent “safety of the public.” Without a full

understanding of load paths, load redistribution, and assumptions in approximate analysis this engineer may not understand why a supervisor decides that a slightly overstressed member (per simplified design) is acceptable. The inexperienced engineer may feel that they are being asked to risk public safety, or alternatively extrapolate this statement to erroneously think that overstressed members are generally acceptable since “we use all of those load factors to be conservative and account for this”. The senior engineer, on the other hand, may have spent many years investigating the conservative aspects of typical designs, and feel comfortable that a more in-depth analysis would result in excess capacity for this specific design. To be clear, the senior engineer’s decision is not more ethical, but is based on a different perspective. Without this knowledge, it would be problematic to blindly allow variance from specifications, and calculations must be provided to justify the variation (and ethical discussions can follow regarding a scenario where these are not provided). However, it may also be found that the company culture has taken this type of decision in the past and incrementally applied it to a wider scope until it is common practice, but not a valid or ethical practice. Similar examples can be found in other fields, where the design life of a product may differ from in service conditions and replacement orders.

The influence of perspective: Further incremental imagination exercises can evaluate effects of decisions on and perspectives from stakeholders further removed from a student’s experiences. This can include owners, peer reviewers, users of structures, community members, the profession, society, and the environment. Even when incremental steps are used, at some point it is difficult to fully imagine oneself in the situation, hence losing the reflexive components of a scenario. However, bringing in perspectives of stakeholder accounts such as the 2019 ASEE Distinguished Lecture – Community Engagement Ethics – First Steps in a Conversation with Affected Communities (available on-line) [32] can be very effective at seeing non-engineer perspectives. It is noted that some fields, such as structural engineering, can find it difficult to integrate societal and environmental effects of decisions, and therefore instructors often jump to environmental scenarios such as chemical spills, wastewater, pollution, as in these stakeholder accounts. However, there are many related issues in every field, such as dumping of construction materials from demolition, approval of alternate products (such as concrete admixtures or materials for post-installed attachments of unknown performance or toxicity), and engineering responsibilities related to inspection or approval of construction alternatives. With recent catastrophic failures such as the pedestrian bridge collapse at Florida International University, or the Champlaign condominium collapse, students may have a sense of the potential danger to society. However, rather than using these as examples it is recommended to discuss general inspection and construction issues. For instance, in a design class one could ask how much variation from a calculated deflection would be reasonable during construction, or who should be responsible in evaluating and regulating life cycle deterioration of structures and how much corrosion and cracking is acceptable in a structure. These catastrophic failures can be used to benchmark obvious ethical lapses, but it is important to realize that these can only be seen in hindsight. What would be the cost to society of closing down all bridges or condominiums with the damage that students think is unacceptable? Can the students articulate the risk associated with damage states? What is the cost of a mandatory inspection or rehabilitation program? What is an acceptable risk against collapse and do the LRFD manuals adequately include this? Are the risks of deteriorating structures shared equitably across society? Only with a discussion that considers all of these stakeholders, perspectives, risks, standard practice, community concerns,

and other topics can the students begin to see the wide ranging impacts of their decisions. These discussions can also be fully integrated into design curriculum, providing students with a much deeper understanding of the probabilistic basis for load factors, the need for life-cycle assessments, and the construction and durability considerations that a designer needs to consider during design, rather than envisioning structures as static in time.

Scenarios such as these can be used to illustrate how personal and working relationships, site and company cultures, and personal experiences can influence ethical decisions. Ethical perception of each person in a scenario can vary depending on their individual experiences and perspectives. Equally important, an individual's ethical perception can change as they gain more knowledge about the dilemma, either as the decision is being made, or through a longer time continuum as they gain experiences. However, unless one can fully imagine oneself in the scenario it is easy to state what each person should do, without feeling the inner conflict of the decision and possible dichotomy between the cognitive and reflexive responses. Without understanding the reflexive aspect of an ethical dilemma it is easier to discuss an outcome, but this does not provide preparation for a similar future dilemma one may find oneself in.

Take aways and direction

This paper has presented the concepts of moral imagination and the process of making real time decisions with the purpose of highlighting their importance in discussing ethics. Without the use of incremental imaginative steps discussions can devolve into purely cognitive analyses that miss the physical and emotional responses and biases that bring the self into the decision process. If instruction does not include awareness of and practice resolving the inner conflict between reflexive and cognitive responses a person may be ill equipped to make a real time ethical decision.

The purpose of moral imagination is not to validate a range of questionable decisions or invoke moral relativism. The purpose of these understandings is to be fully aware of our decision process, other perspectives, and impacts of our decision in order to improve our future decision process. Decisions can be affected by the history of the work environment, company culture, the extent of training and mentoring, personal relationships, and even a person's current mood. A person must make the most ethical decision they can considering the information available to them at the time, but we must also realize that someone arriving at an opposing decision is not necessarily "unethical" but may have brought different experiences and information to their decision.

A case has been made for the need for reflexive responses and imagination exercises in discussions and conclude that ethics instruction should teach people to

- Recognize their decision processes
- Make informed decisions that incorporate the widest possible perspectives
- Acknowledge changing ethical perspectives with time, experiences, and knowledge
- Prepare for future decisions by practicing active "what-if" imagination exercises
- Avoid ethical fading
- Be aware of company and jobsite culture
- Mentor effectively

While this paper has been focused on curriculum instruction, it is directly applicable to continuing education trainings and mentoring of employees. The experiences of an individual can limit the situations that they can imagine themselves in, which can limit readiness to resolve ethical dilemmas. By practicing “what-if” scenarios, having open communication, questioning standard practice, and leading imagination discussions related to impacts from decisions, companies can instill ethical standards that are clear to interns and experienced engineers alike.

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