A Reflective Analysis on Professional Codes of Ethics

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Abstract

This paper explores some limitations of professional codes of ethics in engineering. While codes are perhaps adequate guides for action in well-defined and familiar moral situations, they are less helpful when circumstances are novel or unique. Some have argued that interpretation plays a central role in understanding and actively applying professional codes of ethics, and while we agree, we also believe engineers must be equipped to critically evaluate and interpret concrete situations from a moral perspective. While codes play an important role in professional engineering, engineers need to be well equipped to proactively and critically interpret unique moral considerations and contexts.

Introduction

What is the basis that makes engineering a profession in the first place? This still remains an open question in the professional ethics literature. Depending upon how one construes ‘profession,’ engineering either does or does not measure up to the mark. Too broad a definition and one risks capturing things that few people would want to consider professions; broad definitions are more able to capture all engineering, though perhaps at some expense. Too narrow a definition and only classical professions (doctors, lawyers, the clergy, etc.) count. Licensed professional engineers might fit into this latter, narrower definition, but there are plenty of professional engineering societies with professional codes of ethics that would be left out, and there are still more practicing engineers who do not belong to a professional society at all.

This raises the question as to how engineers are bound to a code of ethics, even if they eschew membership in a professional society. A number of views have been proposed, but one of the more popular views begins by defining a profession as a group of people who seek to cooperate in the service of a shared ideal [1]. A code of ethics is, on this view, essential for any group of people organized towards some ideal of service and whose activities are interested in benefitting non-members. This is too broad a definition of profession, since it captures groups and activities that few would want to consider professions. Furthermore, it makes no mention as to whether the group’s actions indeed benefit the public.

Engineers are bound to abide by the codes of conduct promulgated by professional engineering societies. Practicing engineers, as professionals, are required to conduct themselves at least in a morally permissible way. At a minimum, engineers are required not to do anything to violate their code of ethics. For engineering, the important consideration is whether all engineers who have graduated with a B.S. from an ABET accredited institution, even those engineers who eschew membership in a professional society, are professional engineers. There is no easy way of defining small ‘p’ profession such that it is sufficiently broad to capture all engineers while remaining narrow enough to avoid including groups that clearly are not professions.
Our ensuing discussion assumes that engineering is a profession and that all engineers are, in the relevant sense, bound to abide by their professional code of ethics. In this paper, we seek to (1) understand the function that professional codes of ethics perform in engineers’ ethical deliberations, (2) argue that professional codes of ethics are a rule-utilitarian enterprise, (3) explore some difficulties presented by problems of conflict and ambiguity for rule-utilitarianism, (4) consider whether interpreting one’s code can overcome all such problems, and (5) argue for the centrality of interpreting concrete situations from an ethical perspective in engineering ethics.

What function do codes of ethics perform in typical engineers’ deliberations?

There are a variety of professional engineering societies, each with their own code of ethics. These codes vary somewhat from discipline to discipline, but they largely reflect the elements once found in the ABET code of ethics. See Figure 1. Since ABET is the accreditation body for undergraduate engineering programs, it perhaps offers the best candidate, though outdated, for a code of ethics to which all engineers ought to adhere. Thus, the ABET code is largely indicative of how all engineers are expected to morally conduct themselves. ABET’s code of ethics is composed of four “fundamental principles” and seven “fundamental canons.” The principles intend to outline the general ethical standards for engineering in the form of four general axioms that engineers have and to whom they are owed. Principles I and II express general duties of beneficence, nonmaleficence, fidelity, and honesty owed to non-engineers. Principles III and IV express general duties engineers have towards themselves and each other, including self-improvement.

The Fundamental Principles
Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:
I. using their knowledge and skill for the enhancement of human welfare;
II. being honest and impartial, and serving with fidelity the public, their employers and clients;
III. striving to increase the competence and prestige of the engineering profession; and
IV. supporting the professional and technical societies of their disciplines.

Figure 1: The Fundamental Principles as found in the ABET Code of Ethics

The Fundamental Principles are followed by seven Fundamental Canons, which largely echo but provide a slightly more detailed account of the professional duties mentioned in the Principles. See Figure 2.

The Fundamental Canons
1. Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties.
2. Engineers shall perform services only in the areas of their competence.
3. Engineers shall issue public statements only in an objective and truthful manner.
4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.
5. Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.
6. Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the profession.
7. Engineers shall continue their professional development throughout their careers and shall provide opportunities for the professional development of those engineers under their supervision.

Figure 2: Fundamental Canons as found in the ABET Code of Ethics

Codes of ethics like the ABET code are more than just a written version of our vague common sense moral precepts—they are systematized and made more detailed and immediate to the profession. Nevertheless they capture some basic axioms of common-sense morality and aim to characterize them more explicitly in light of the unique features of professional engineering. That we should, whenever possible, avoid telling a lie, or pursue our own ends to the detriment of others’ welfare, or do others harm, are not themselves anything unique to professions. What is unique about professional codes is their explicit consideration of what these common-sense moral precepts require amidst the kinds of relations, powers, and abilities one has as a member of this or that profession. This raises the question as to whether professional codes of ethics can be relied upon as determinative guides in difficult moral circumstances.

As members of a profession, engineers are morally obligated to conduct themselves in their professional capacities according to their code. Following the code is obligatory; though in what sense codes are morally binding has been an area of some debate. One of the more popular views claims that engineers are so obligated because the profession is entered into voluntarily, because the code itself has morally permissible content, and because it is rational to conduct oneself accordingly. Davis, for instance [1,2], argues that moral codes are a solution to a coordination problem. In order to be able to work towards engineering’s particular ideal of service, engineers, qua engineers, give up certain freedoms by agreeing to “generally” abide by their code. Thus, voluntary participation in a profession engenders a sort of implicit contract between each member and the profession at large: engineers agree to conduct themselves according to their code by becoming engineers, by pursuing engineering degrees and jobs. They do so because they enjoy the benefits that come with being an engineer, many of which are possible precisely because of engineering’s status as a profession.

The Rule-Utilitarianism of Engineering Codes of Ethics

Taking Davis’ account of engineering codes of ethics as the basis for our discussion, what sort of moral theory is the code an instance of, and what function does it perform? We saw that they are a solution to a coordination problem. In order to pursue their particular ideal of service, engineers have to give up certain freedoms. They cannot place their own or their employer’s interests above those of the public, they cannot
practice in whatever way they see fit, they cannot arbitrarily establish their own standards, and so on. In this sense professional codes of ethics systematize the “rules of the game,” making clear what engineers owe the public and what engineers can reasonably expect from each other. Engineers have good reason to conduct themselves according to the rules in part because they stand to benefit as a fellow engineer. Beyond their professional reasons engineers also have good cause to abide by their code because they, and many people they care about, are members of the public that frequently come into some sort of contact with engineered things.

There are a number of professional benefits enjoyed by engineers and ultimately made possible by broad adoption of a code of ethics. An example Davis offers, via an analysis of Robert Lund’s decision to “think like a manager” rather than an engineer is how engineers qua engineers are, due to their code, more empowered to reject an employer’s request. Lund, then the vice-president of engineering at Morton Thiokol—the company responsible for the O-rings whose failure led to the Challenger disaster in 1986—found himself in the unfortunate position of being pulled away from his professional obligations by other considerations. Through his discussion of Lund’s case, Davis argues that an engineer can object to work that would violate the code as an engineer rather than simply as an individual. If one objected to a project without the ability to appeal to anything beyond one’s moral conscience, one might easily be construed as a moral crusader and may very well be fired and replaced by an engineer greater degree of moral malleability. By invoking one’s code, however, it immediately becomes apparent that other engineers are likely to similarly object. In this way, being able to appeal to one’s profession as grounds for one’s objection carries with it additional weight. It is less likely that another more opportunistic engineer will take one’s place, and provides something of a dispassionate foundation for one’s objection in the first place. Engineers are consequently relieved of much professional pressure to do something they find morally questionable or impermissible.

Beyond the immediate professional benefits made possible by the code of ethics, engineers can also look to their code as a guide to basic ethical conduct in engineering. If an engineer were to encounter a morally salient situation, say, if she’s asked to leave out some information about the energy efficiency of a new building in a statement to local officials, she can consult the code to see whether such an act is permissible. This is a necessary feature of any moral code. It is also implicit in the claim that, because of their shared code of ethics, engineers can object to or abstain from a project on moral grounds. If objecting to a project by appeal to one’s professional code is to carry weight, the code must play a justificatory role in the objection (i.e., it must appeal to one or more of the axioms listed in the code that the engineer would violate by participating), otherwise the objection is based on mere private conscience. For instance, in Thiokol’s case, had Lund refused to change his mind and keep the astronauts’ welfare as his top consideration, he would have implicitly appealed to Canon I of the ABET code.

What sort of a general guide is this, and, more importantly, how does it relate to engineers’ moral choices? An engineer that adheres to her code has good reason to do so. She benefits (because she can object or abstain on professional, rather than personal,
grounds), the public generally benefits (because engineers generally abide by the code, which contains provisions specifically in the public interest), and other engineers benefit (because they are able to follow their shared ideal and participate in a broadly well-regarded profession). These benefits accrue insofar as most engineers act in accordance with their code most of the time.

The codified rules, however, are not endowed with extraordinary power in Davis’ view, since he allows for the prospect that a departure from the code could, in some limited instances, be justifiable. This would be impossible if the code were to function as the sole criteria for correctness and reasonableness in moral questions. But as Davis does not endow the code with too much power, he also does not mention what a justified violation would amount to. In Lund’s case, his departure was not morally justified because it hinged on an appeal to his employer’s interests rather than the interests of the public. Such an exception cannot legitimately be incorporated into a professional code of ethics, since doing so would undermine the essential purpose of the code, i.e., its function as a solution to a coordination problem. We might put this point another way: Lund’s decision to green light the shuttle launch, and the reasons that that justified his decision, are not universalizable under the code. He could not rationally want all engineers to act in their employer’s best interests whenever they encountered a similar conflict because he, or someone he cares for, might suffer as a result. Thus, appeals to self-interest or employer interests to justify an action cannot be acceptable because they place the interests of a small group above those of the general populace. If such appeals were taken to be legitimate justificatory considerations, then the benefits experienced by both engineers and the public that we discussed above simply wouldn’t be possible.

A code of ethics is necessary for a profession to make it clear that appeals to self-interest, or the interests of one’s employer, are unjustifiable. The rules in the code are selected because their broad adoption tends to produce the best overall state of affairs for engineers and the public at large, i.e., professional codes of ethics are constituted by a set of rules the adherence to which tends to promote the general good. We can therefore view an engineering code of ethics as a rule utilitarian enterprise, one that engineers are obliged to follow on voluntaristic grounds.

According to rule utilitarianism, an action is right if and only if it is permitted (or wrong if and only if it is forbidden) by a rule the compliance with which maximizes the general good. Agents are bound to conduct themselves in moral matters according to the rules, and the rules are selected according to whether their adoption will maximize utility. This modification of the classical utilitarian theory is an effort to avoid some of the more unwelcome and counterintuitive requirements imposed by the principle of utility, such as, say, being morally obligated to sacrifice one’s personal relationships, or harm one person to increase the welfare of millions. Rather than evaluating each action according to the net good or harm that will come from it, rule utilitarianism assesses and adopts rules according to their overall net benefit. Adopting rules that tend to promote the greatest utility affords a place for personal relationships and special duties that classical utilitarianism cannot, better coheres with our general moral beliefs, and also minimizes the amount of calculation required for each action.
By adopting a set of rules in this way, rule utilitarianism is committed to the thesis that there exists an irreducible plurality of moral considerations. The rules function to highlight these several considerations and express them in clear and unambiguous terms so they can guide conduct. The idea is that when the code is sufficiently clear and captures all relevant considerations, acting in accordance with it will render the greatest overall good. The ABET code—and others like it—captures a plurality of moral considerations pertinent to the engineering profession and expresses them in terms of the particular sorts of circumstances engineers qua engineers find themselves in. It functions as a solution to a coordination problem because its adoption has the rational appeal of any standard: widespread adoption and general adherence renders more good on the whole.

Conflict Problems and Interpretation

According to his sentiments elsewhere, Davis [4] does not take engineering codes of ethics to be perfect or complete. Instead, like when he discusses Lund’s poor justification for violating his code of ethics, he allows for the possibility that the code is fallible. Rather than argue that any departure is immediately illegitimate, Davis simply points out that Lund’s reasons for doing as he did were insufficient. In this sense, departures or violations of the code may be permissible, so long as departures are rationally justified. In those rare instances where it might be morally required to lie to one’s employer, mislead the public, not hold paramount the safety, health, or welfare of the public, and so on, an engineer ought to have a sound reason for doing so.

Davis gives a sketch of what such a departure might look like in Three Myths About Codes of Engineering Ethics, where he emphasizes the role of interpretation in the practical application of codes of ethics. Among the many different ethical views offered by philosophers over the years, almost all suppose some connection between moral conduct and reason1, and here Davis is no exception. Interpretation is necessarily a rational and reflective act, one that incorporates literary and historical context as well as moral considerations throughout deliberation. In other words, violations of a code of ethics must be rationally justifiable on moral grounds. Some moral rule or other, whether included or omitted from the code itself, therefore functions as the sole determinant of right action.

There are a few possible ways of construing this claim. First, one might hold that a violation is justified by some moral axiom that is not yet present in the code, but would be decisive if it were. On this view the code is simply an incomplete list of axioms pertinent to engineering and can be added to as novel circumstances occasion new, incommensurable moral considerations. A second way of understanding the claim is that the Principles and Canons are complete in their current form, but are in need of further

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1 When moral theories have claimed that morality is fundamentally non-cognitive, this has often been a consequence of a broader epistemological or metaphysical view that we have no reason to suppose Davis holds. For an example of a non-cognitivist theory of ethics, see A.J. Ayer’s Language, Truth, and Logic.
refinement in order to guide conduct in every possible moral situation. In the final analysis, however, they will be found to be complete and mutually consistent. A departure is only apparent; upon refinement of the code it will turn out to fall under one or other axiom.

In *Three Myths of Engineering Codes of Ethics*, Davis [4] takes a more sophisticated tack. He argues that any particular axiom in a code of ethics, or its omission, is necessarily open to interpretation. The inclusion of an axiom in a code, or its placement amongst other included axioms, does not mean that it is necessarily of greater importance than other moral considerations in every circumstance. Similarly, that a consideration is not included in the code does not necessarily mean it is not pertinent to engineering; it could, for instance, mean it is so essential to engineering that its relevance “goes without saying”

Regardless of how we might understand the claim that violations can be rationally justified, there remains a type of moral problem not obviously soluble by appeal to the code. In relatively straightforwardly moral situations, codes are adequate (intentionally harming one’s employer, making a clearly unsafe device, creating a device to circumvent regulations, etc.). Even in morally complex or ambiguous situations, active interpretation of one’s code of ethics can lead to a clear decision. But it remains possible for engineers to encounter concrete situations where two incommensurable moral considerations carry equal weight, where interpreting one’s code cannot be decisive. These problems are in fact particularly prevalent for engineers designing and using new technologies. When engineers encounter these problems, known as conflict problems, what are they to do?

Conflict problems are characterized by a situation in which two or more relevant moral considerations determine multiple, incommensurable courses of action [3]. Engineers, for instance, have a duty to “hold paramount the safety, health, and welfare of the public.” They also have a responsibility to “act for each employer as a faithful agent or trustee.” Consider a situation where an employer asks an engineer to design a fuel injection system for an inexpensive internal combustion engine that dramatically increases fuel economy, but also has the known side effect of increasing the engine’s total output of soot. If designed and built, it is likely that the public will experience some detrimental effects to their health. But projections indicate that such an engine would quickly gain widespread industry acceptance, and so stands to help significantly reduce vehicle CO2 emissions long-term. In this situation, how far can engineers risk public health to protect their employer? More to the point, to what degree is it justifiable to increase fuel economy at the expense of public health?

If we take Canon I of the ABET code at face value, the answer to the former question is that engineers cannot risk public welfare, even for their own or their employer’s sake. Davis’ example of Lund’s situation in the Challenger disaster is

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2 This is a poor explanation for why a moral consideration would be omitted from a code, and Davis acknowledges as much. Indeed, he goes on to point out that it is precisely the obvious considerations that *should* be included in the code.
precisely this kind of problem. Lund found himself confronted with two incommensurable considerations, and by choosing the course of action justified by Thiokol’s interests rather than those of the public (i.e., the astronauts) which he is obliged by his code to hold paramount, Lund acted immorally. However we might understand ‘paramount,’ it is clear that it is meant to take precedence whenever it comes into conflict with another moral consideration. Canon I would then appear to resolve any possible conflict problem from the start.

Indeed, in *Three Myths* Davis argues that such conflicts are generally resolvable by interpretation [4]. The trouble with our engine example, however, is that it is not clear which action *would* “hold paramount the safety, health, and welfare of the public,” and it isn’t immediately obvious that interpreting one’s code can alleviate the difficulty. The moral ambiguity of the situation is not the result of the ambiguity of language, but instead from the ambiguity present in the situation itself. On one hand, increasing fuel economy is a clear good since fuel-efficient vehicles are cheaper to operate and produce fewer greenhouse gases on the whole; on the other hand, this engine produces more soot than less fuel-efficient options so it is likely to cause, or at least contribute to, public respiratory issues. One might argue the engineer interpret their duty as, in this circumstance, requiring they calculate the total potential harms and benefits of each course of action and selecting the one that would produce the most good overall. In other words, one would think that a rule-utilitarian moral system would, in the face of such a conflict of considerations, have recourse to the principle of utility to resolve it. The rules are justified because collectively they tend to produce the greatest overall utility, so any conflicts between (or within) them can be resolved by determining which course of action is likely to render the best consequences.

But as we saw above, rule-utilitarianism adopts rules explicitly to *avoid* certain unwelcome results of the principle of utility, such as willingly harming some few for the benefit of many others. The rule-utilitarian, therefore, cannot suggest that conflict problems are properly solved by considering which of the possible actions most advances the consideration that justifies the rules. As we saw above, the rules of morality themselves (regardless of their inclusion in, or exclusion from, the code) must function as the sole determinants of right action. Our engineer can, at most, only view Canon I as of a higher rank than the others, not as an invitation to use the principle of utility when confronted with a conflict. So how is an engineer to solve this sort of problem?

*Interpretation under Rule-utilitarianism*

Engineers, when posed with an actual practical problem, sometimes find themselves confronted with a particularly difficult conflict problem [3]. Since engineers cannot perform a utilitarian calculation to address such conflict problems, rule-utilitarianism must offer some account of how such problems can be properly solved. Unfortunately, however, rule-utilitarianism cannot acknowledge genuine conflict problems—instead, it is committed to effectively denying their existence.
Recall the three ways we might understand how a violation of the code can be rationally justified. In one instance, a rationally justified violation is only a violation because the code is incomplete. The action coheres with a moral axiom that has not yet been identified or distinguished, but nevertheless is part of the ideal code. The second option is to claim that the action is in accordance with some moral axiom already present in the code, but this axiom is in need of further clarification and refinement. This would mean that a justified departure from the code is evidence that one or more axioms are insufficient in their current formulation or are not adequately understood.

Notice that in these first two cases, a rationally justified departure is possible because of some omission or ambiguity in the code of ethics. The code is either currently incomplete, or it is complete but not sufficiently understood. This implies that the principles of morality, properly grasped and systematized, do not allow for rationally justified violation. Because morality itself is wholly self-consistent and complete, what it requires of us is invariant over time. What appear to be changes or new moral considerations are therefore, on either view, merely the result of our limited epistemic position.

Rule-utilitarianism, in a general sense, views conflict problems in much the same way. We saw that it is committed to the thesis that there exists a plurality of irreducibly different moral considerations, and that these considerations, properly understood, never come into conflict with one another in concrete practical situations. Underlying this thesis is the assumption that morality forms a deductive system. This is quite an assumption, and certainly one that engineers should find fault with. We have no good reason to suppose that morality is fundamentally any different than other practical areas. Our practical principles change as our circumstances change; advances in science, technology, and society demand we constantly reflect upon how we should act, how we think about and solve practical problems. Why should we suppose that our knowledge of what ought to be takes the form of a mathematical system, when the rest of our knowledge of what is does not?

It seems incompatible with practice to suggest that rational agents are passive with respect to moral rules in this way. Moral life, we have reason to believe, consists in more than blind obedience; being reasonable in moral matters is precisely the same as being reasonable in practical matters. In her professional activities, an engineer who proceeds reasonably and intelligently in accordance with rules does not passively and blindly follow them. She actively applies them to the problem at hand, interpreting, manipulating, and modifying them as the situation calls for it. This is an activity that can be done well or poorly, rationally or arbitrarily, intelligently or foolishly. Central to this task are such intellectual activities as determining whether a rule applies, considering both the circumstantial as well as the literary and historical context, and resolving conflicts according to the nuanced contextual features present in actual circumstances. Such intellectual capacities make little sense if morality is presumed to form a deductive system.
Davis’ sophisticated account, in contrast to the two options presented above, retains the essential role that codes of ethics play in the engineering profession while acknowledging that they cannot clearly decide every possible case. There are genuinely novel moral situations where the code may be vague, or may not include a decisive consideration. Nevertheless, engineers are able to actively engage in moral deliberation by interpreting their code. Interpretation, according to Davis, means taking into account quite a bit, including literary and historical context as well as “…definitions of relevant terms, examples of application, and so on” [4]. As our thought experiment above demonstrated, however, relevant interpretive challenges extend beyond those presented by the code. Much of the difficulty given by moral situations, like engineering problems, rests on how one interprets the situational context—that is, the concrete features present in the situation. There are instances in which it is not immediately clear what features carry moral import, or which are stronger, or whether we’re even identifying them properly. So interpretation indeed plays a central and important role for professional ethical conduct—but interpretive challenges are not confined exclusively to professional codes of ethics.

To be clear, we are not claiming that engineers passively or blindly follow the rules, nor are we saying engineers are incapable of deep sensitivity to concrete moral contexts. Engineering itself has been called a science of the particular, and for good reason: it cannot succeed without being fundamentally sensitive to unique and novel contextual features. Engineering is characterized by active and involved practical reason, by the active application of rules, theories, and methods to the problems at hand. Engineers change and adapt rules as the context calls for it. That is, rules, theories, and facts all play an important role, but none takes absolute precedence over the unique and nuanced contextual features present in any given situation.

**Interpreting Concrete Ethical Situations**

If it is the case that 1) engineers cannot rely on their professional codes of ethics to determine the moral course of action in every morally relevant situation, and if it is true that 2) engineers, *qua* engineers, find themselves in unique sorts of moral situations, then engineering ethics education needs to ensure that engineering students are able to critically interpret and evaluate situations from an ethical perspective. The passive notion of practical reason is problematic for the simple reason that it supports the belief that moral right and wrong are fixed from eternity, that the moral is an area of human conduct separate from the technical and the practical. The closer we look at moral circumstances and decisions, however, makes this assumption appear more and more implausible. Morality is not some separate and distinct area of human activity—it is continuous with and inseparable from regular everyday practical reason, from how we look at and think through real situations as they arise in our lives.

Our practical and technical decisions have moral import, and our moral deliberations have practical and technical implications. While we acknowledge that codes and traditional moral theories play important roles, they alone are not sufficient. Engineers need to be able to view the practical, the technical, and the moral aspects of their
everyday situations as equally present and important. This means engineers need more than a semester studying ethics in a single class, and more than a cursory understanding of ethical theories and codes of conduct. If it is indeed the case that moral, technical, and practical considerations are all equally important and interdependent in engineering, then this calls for more thorough inclusion of ethics in engineering curricula. As we have noted, engineers are already well equipped for the kind of contextual and creative deliberation ethics calls for; what should be considered is how, and in what way, interpreting concrete situations from an ethical perspective can be thoroughly included in engineering education.

**Summary and Conclusions**

This paper critically explores the scope of engineering codes of ethics as rule-utilitarian ethical systems and how engineers apply their code in practice. Then we considered the limitations of such codes, by examining situations of clear moral importance where codes of ethics are silent or ambiguous. We demonstrated a few theoretical issues that render rigid rule-based ethical systems, like professional codes of ethics, to insufficient guides for moral action. Finally, we concluded with the importance of critical situational interpretation from an ethical perspective as implications of this view for engineering education and practice.

**References**