

Educating - ethics

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ABSTRACT: *Ethics*, or *ethical behaviour*, is generally considered to be what holds society together by providing a set of rules that prevent individuals from behaving in ways that would fracture, even destroy, that society. As corporations are part of society, some such set of rules should apply to them also, and hence to engineers, individually and in corporations. However, *ethics*, in a gathering of engineering or business people, usually means what the author chooses to term *Big-E* ethics: the interfacing between the profession (and business) and the community-at-large. The junior engineer is much more likely to meet problems in *small-e* ethics, which involve interfacing honestly, ethically, with peers and other colleagues. In this article, the author provides the background of the *Big-E* ethics and *small-e* ethics concepts and outlines an investigation into the responses of student engineers to ethical problems, leading to the question whether *ethics* can be educated, and what of the subject *could* be given to undergraduates.

THE PATH TO THIS INTERESTING TOPIC

For many years, the author has recognised that management's principal task is decision-making, and has emphasised that task in the core management subject the author has provided engineering students through some 17 years. However, the management decision-making task is rendered difficult by the conditions surrounding managers: their decisions must usually be based on inadequate and ambiguous information, and on an uncertainty of outcomes, in situations where conflict is often inevitable. Examples of these have been presented to students in the author's series of cases studies [1].

That recognition led to an interest in management mistakes, as a sub-set of the topic *human error*, but noting that managers are like doctors and can bury their mistakes (not in the ground, but in the organisational structure). This led to an experiment that simulated a particular form of possible management error, and which confirmed the hypothesis that preceded the experiment [2].

The above background has led to the view that ethics in the business context refers to *Big-E* ethics; corporate matters like upholding both the letter and the spirit of the many laws affecting enterprises, being conservative in operations which may generate waste and pollution, honesty regarding taxation and executive salaries, and giving shareholders fair dividends. This may also include all the stakeholders, such as the employees, unions and the community in the application of *Big-E* ethics.

The other source was the author's research work into the relationship between hazards and management practices in the chemical industry [3]. One observation from that work was that many disasters (eg Bhopal, Phillips, Challenger) have been the sum of a series of small management errors: therefore, the author reasoned that if managers improved their reaction to small matters, the full-scale disasters would be less likely to occur.

The next step in the thought process was to the internal workings behind decision-making and subsequent mistakes that lead to a questioning of the concept of standards held within the manager's mind, not necessarily of a corporate nature, which was one source-idea of *small-e* ethics.

A GENERAL DEFINITION OF ETHICS

The St James Ethics Centre in Sydney has existed since 1988, and provides advocacy, consultancy and counselling services. Their mission, which may be taken as covering something of a definition, is to encourage and assist individuals and organisations to include the ethical dimension in their daily lives, thereby helping to create a better world.

Finding a general definition in the literature is far from easy. The *Oxford Dictionary* related *ethics* specifically to *the science of morals, moral principles, rules of conduct*; however, as a comment on that, the author has had difficulty associating the terms *science* and *morals* with each other.

There are references specifically on ethics. An early writer on the more specific topic, *Business Ethics*, Garrett, specifically stated that *ethics is not about morals*, but tended to confuse the situation by adding that ethics is *conformity to conventional social rules or the existing moral judgements of men* [4]. Another early writer, Higgins, succeeded in enhancing, although perhaps further slightly confusing, the issue with a clearly stated definition:

Ethics is the philosophical science which establishes the right or moral order of human acts, that is, in the light of first principles ethics establishes the absolutely necessary norms of free acts whose realization in practice truly makes us men [5].

It is interesting to note that both Garrett and Higgins place the initials *SJ* after their names. That connection may have influenced their opinions, the essence of these being that human actions, while having a free will aspect, should be constrained by a higher purpose.

One would expect a more recent book would open with a succinct definition; well, that is what an engineer would expect, but Preston went through 15 pages of general discussion before reaching a definition [6]. Although it is not given in an *engineering manner*, it is reasonably clear from these selected sentences:

In general, ethics is concerned about what is right, fair, just or good, not just about what is the case or what is most acceptable or expedient.

Ethical claims prescribe rather than describe. They are concerned with how people ought to behave and suggest how social and individual behaviour can be improved.

The terms morality and ethics are often interchanged. Ethics has a double meaning. It may refer to the study of our values and their justification. On the other hand, ethics may also mean the actual values and rule of conduct by which we live, or our morality [6].

Others have generally agreed with the above, although there seems to be some division. Johnston et al differentiated between *morals, which centers on rules of right conduct for individuals, and ethics, centering on systems of moral principles and rules of conduct for the behaviour of groups* [7]. Others (eg Eells and Nehemkis) have pointed out that what is *ethical* in one society is unacceptable in another [8].

Donnelly et al have suggested that a reasonable person would find a balance between *what is good for the individual - egoism - and what is good for society - altruism* by adopting an *obligation to a formal principle* [9]. This concept has been intriguingly echoed in a recent editorial by Schmidt, a retired academic, who expressed the view that *the real reason for behaving morally is that doing so helps a society survive and prosper* (he admitted at the beginning that he was using the words *ethics* and *morality* interchangeably, even though they are not quite the same) [10].

Babcock (quoting Gluck) provided a distinction between ethics and morals:

Morality is concerned with conduct and motives, right and wrong, and good and bad character. Ethics is the philosophical study of morality; it is moral philosophy [11].

So, the search for a tight definition stalls in the wake of many variations on the theme; however, it appears *ethics* relates to rules of behaviour for society as a whole, which indicate how individuals *should* behave, which in turn now suggests that we could look at ethics in the particular context of the individual, for which the author invites reflection on a view presented by Asimov, who offered, in the short story *Evidence*, an ethical puzzle: whether a certain prosecutor named Byerley was a human being, or a very fully, carefully, disguised robot [12]. What made the puzzle difficult was summed up in a statement by another character in the story, a psychologist:

Because, if you stop to think about it, the three Rules of Robotics are the essential guiding principles of a good many of the world's ethical systems. Of course, every human being is supposed to have the instinct of self-preservation. That's Rule Three to a robot.

Also every good human being, with a social conscience and a sense of responsibility, is supposed to defer to proper authority; to listen to his doctor, his boss, his government, his psychiatrist, his fellow man; to obey laws, to follow rules, to conform to custom - even when they interfere with his comfort or his safety. That's Rule Two to a robot.

Also, every good human being is supposed to love others as himself; protect his fellow man,, risk his life to save another. That's Rule One to a Robot.

To put it simply - if Byerley follows all the Rules of Robotics, he may be a robot, and may simply be a very good man [12].

For the information of those reading this but who are unfamiliar with this work, the *Three Laws of Robotics* are as follows:

- 1. A robot may not injure a human being, or, through inaction, allow a human being to come to harm.*
- 2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.*
- 3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law [12].*

Indeed, it is interesting to consider that the above *Laws* are so very human, even though they were originated with respect to *machines*, and they describe quite clearly *an ethical person*.

In summing up, it is concluded that what is involved in ethics as a philosophy (or whatever one takes it) provides a standard of behaviour that should be followed for the good of humanity generally.

THE ROBIN HOOD PARADOX

Having revealed some of the difficulties in defining ethics, another aspect of ethics can be looked at in a particular context. This aspect is the relationship between *means* and *ends*, and is another feature of understanding ethics, summed up neatly by Garrett, as follows:

If both the means and the end I am willing are good in and of themselves, I may ethically permit or risk the foreseen but unwilled side effects if, and only if, I have a proportionate reason for doing so [4].

His point may be stated as: if I am doing something *good*, using an ethical process or procedure, I can allow undesirable events to happen. This is the *greater good* philosophy. As an example of that, consider the triage principle used when assessing casualties, military or otherwise: those who would die with or without treatment are set aside and allowed to die, leaving treatment available for those who would recover. The *end* of allowing some to die is *ethical* because treating those who would recover is proportionally *good*.

The term *Robin Hood Paradox* has been coined for this, based on that legendary character's practice of stealing from the rich

and giving to the poor. One may argue, and agree, that taking funds from the rich to support poor folk is desirable, and quite ethical, hence R. Hood is to be applauded for such ethical behaviour, but the reasoning bogs down on his method of getting the funds, which is not ethical, being criminal.

On another hand, one must admit this is what the government does, it takes funds from wealthier people by taxing them at a higher rate, and hands out some of that via social welfare. One might speculate whether Australia's ATO-DSS combination justifies those actions by recognising the *greater good*.

BUSINESS ETHICS?

The term *business ethics* can promote hysterical laughter; indeed, Carmichael and Drummond regard it as oxymoronic: *like military intelligence - a contradiction in terms* [13]. Later, Solomon expressed the belief that we have passed the period when such remarks would be made [14]. Yet the (cynical?) thought does generally hover in many minds.

Garrett was an early writer on this topic, and his output in the USA seems to have led interest in ethical business practices [4].

As a starting point in tracing the topic's development, the author turned to the writing of the management guru, Drucker, and found that the first 13 of his books on the shelf had no such entry in their index; however, the last three (dated 1973-1974, 1977 and 1982) contained such references. In his 1973-1974 work, Drucker stated *managers, we are being told, have an ethical responsibility to take an active and constructive role in the community*, and he related that to the Hippocratic oath of the Greek physician: *primum non nocere - Above all, not knowingly to do harm* [15].

McDowell noted the tension between ethical conduct in business and the pressure for management-related objectives (and personal goals), such as financial success (equals profit), is, most certainly, *the professional's dilemma* [16].

That tension, and the interface between corporate business and the individual, was explored delightfully by DeMars with countless examples of good and bad behaviour. This multi-definition is buried in her very readable text, as follows:

Ethics is our code of conduct. Ethics are a set of rules and standards which guide our behaviour. Ethics may or may not be written down. We have personal ethics, which guide our personal behaviour (I will not lie to a friend), and we have professional ethics, which guide our professional conduct (I will do everything in my power to support my supervisor). Ethics are rooted in our morals, but they are modified by group decisions, peer pressure, and circumstances (In this department our policy for handling this type of situation is thus and thus). Hopefully, our ethics are an extension and expression of our morals [17].

The reference in the above to not tell lies (which we may reasonably extend from friends to anyone) provokes the question: is it unethical to *withhold* information? One can only note that it is covered by the First Law of Robotics (with the author's emphasis added):

1. *A robot may not injure a human being, or, through inaction, allow a human being to come to harm* [12].

So, if we accept that these Laws describe an ethical person, then we conclude that withholding information is unethical. Common experience tells us we can injure reputations easily by *not* telling the truth.

The author has collected a small library of some 30 references on business ethics, all of which essentially state that corporations and the people in them should behave in ways that are *good* in every way. However, he must admit from having worked in several corporations with a large number of people, that this does not always happen. The need for survival and profit seems often to overcome any good intentions.

As a final word on this sub-topic, consider this from Townsend, the arch-heretic of management: If you have to have a policy manual, publish the Ten Commandments [18].

ENGINEERING ETHICS?

Martin and Schinzinger provide the following definition in a true *engineering manner*:

Engineering ethics is (1) the study of the moral issues and decisions confronting individuals and organisations engaged in engineering and (2) the study of related questions about the moral ideals, character, policies and relationships of people and corporations in technological activity [19].

What sort of ethical issues confront engineers? Babcock has listed five different categories of *ethics*. These are summed up here briefly:

1. *Utilitarian ethics*: to result in the greatest good for the greatest number of people;
2. *Ethical egoism*: rational self-interest;
3. *Duty-based ethics*: asserting moral imperatives that must be obeyed, regardless of consequences;
4. *Rights-based ethical theories*: related to life, liberty and property;
5. *Environmental ethics*: responsibility to animals, plants and even inanimate objects [11].

Harris et al, although writing about ethics in engineering, have opened with a broader view by discussing professional ethics generally, pointing out that professionals have a *role morality* related to their profession [20]. Their general discussion of the characteristics of professionalism, namely: extensive training, knowledge and skills, monopoly of provision of services, an unusual degree of autonomy, and regulation by ethical standards, is well worth repetition. It is followed by their pointing out that not all who claim to be professionals actually have these characteristics. In particular, they point out engineers may not have full professional autonomy and do not have a monopoly on engineering services.

Engineers in the USA have been ahead of their Australian equivalents; Babcock has reported that the first code of ethics was written in 1918 [11]. However, one of his sources recorded in 1983 that *the goal of a universal code continues to avoid the profession*, so they are, perhaps, still working on it. Harris et al list many of the technically-oriented engineering societies in the

USA, comparing them with the American Medical Association and the American Bar Association, referring to each having a code of ethics, but expressing a preference for the code given by the National Society of Professional Engineers.

The Institution of Engineers, Australia (IEAust) has an ethics policy for members [21]. Being a uniform national body, the IEAust has possibly beaten the Americans by providing a *Code of Ethics* that applies to all professional engineers. The 1994 edition was comparatively brief, containing nine *tenets* that members were committed to uphold. The current version (from the Web site) is very similar, with a few additions and alterations, the most significant alteration being changing *shall* to *should* in all the paragraphs that indicate acceptable behaviour, making what was mandatory now preferable.

The main thrust of both the American and Australian codes does appear to be *Big-E* ethics. For example, in the IEAust Preamble, the following *shared values* are listed: ethical behaviour, competent performance, innovative practice, engineering excellence, equality of opportunity, social justice, unity of purpose and sustainable development. A further example of *Big-E* ethics comes from the Institution of Chemical Engineers in England, which has gone as far as warning members about the ethical problem that may arise if one applies a computer program to solving a design problem, without understanding what happens inside the generally-opaque black box [22].

However, there are sections of both the Australian and American Codes that show some interest in the *small-e* ethics: IEAust Tenet No. 4 reads: *members shall act with fairness, honesty and in good faith towards all in the community, including clients, employers and colleagues*. An analysis of the American codes shows many *small-e* qualities under *individual values*, such as honour, personal morality family, friendship and (even) wit, while *professional values* list honesty, fair play, selflessness and tolerance.

A MODEL FOR ENGINEERING/BUSINESS ETHICS?

The references cited above, observations, and further thought have led the author to the early stage of presenting something approaching a physical model to describe bringing together the many facets of the engineering and business ethics dilemma.

Initial discussions suggested that a balance must be found between technical, professional and social requirements, sometimes demands, as the conditions most vital to satisfying the dilemma. This necessary three-way split of concerns then suggests a triangular plane figure poised on a point; under its centre of area, with weights on each corner, each weight representing the intensity of one of the demands, as shown by each of those requirements. This concept has received further development in association with Chatfield, a senior undergraduate student [23].

Another model has been developed from the Blake-Mouton grid, which shows management styles are a composite of concern for output and concern for people [24]. It is suggested that a third axis, *concern for self*, should be added to the grid, as a reflection on the fact that people have their own needs and ambitions [25]. This follows through the third of Asimov's *Laws of Robotics*. The third axis makes the grid three-dimensional and provides levels of distinction between altruism and selfishness.

CAN STUDENTS BE TAUGHT ETHICS?

First, let us consider what happens to the student during early employment. It can be seen that both the American and Australian Codes have something that may be related to personal attitudes. How, then, does that relate to the lower-level, junior engineer?

To answer that, the author must express an opinion, based on unstructured observation: it is considered that the junior engineer is presented with the *big picture* and becomes aware of the *Big-E* ethics of the profession, but only by picking that up from the culture of the organisation in which he/she works.

However, very little of that relates directly to the student-level engineer's work-situation, he/she is most likely to be employed at a junior level where *Big-E* problems are not encountered. The junior engineer is actually much more likely to face *small-e* ethics, which involve interfacing honestly and ethically with fellow workers and other individuals.

It is believed that all engineers meet those situations through working life, even after promotion through the ranks, and it is suggested that learning to deal ethically with the *small-e* problems as a junior may well contribute to shaping the overall ethical behaviour of the senior person.

This raises the question whether an undergraduate course should include something about ethics, to prepare the student for *small-e* problems that may be met, and for the *Big-E* problems that are likely to follow. This comes to a very basic question: can ethics be taught, and in such a way that will favourably affect a person's behaviour?

Looking back at the definitions of ethics, in what is held by an individual, one gains an impression that it is related to the very human trait of distinguishing right from wrong. But people are all different, some see only black and white, some see infinite shades of grey, while some live in Technicolor; some of these differences are due to ancestry and some to the growing-up environment. In order to change the nature of an individual who has reached undergraduate age (say 20) would require brainwashing – or at least dry-cleaning.

Perhaps such vigorous action is not necessary, well, not in the majority of undergraduates, an impression given by the results of a short, informal survey carried out in Sydney and in Bradford (England) to assess student responses to *small-e* ethical dilemmas, reported in full elsewhere [26]. The problems given to the students involved were composed from the author's experiences, but, curiously and coincidentally, many mirrored situations described by both DeMars and Dunkel [17][27]. This suggests that the situations explored in the survey were far from unique to one person's experiences.

This investigation into *small-e* ethics began with the use of a series of quiz-questions as part of subject titled *Engineering Management*. One question, headed: *What would you do if...?* on a slip of paper was handed to a selection of students in the class – each of whom was given no more than five minutes thinking time before having to stand, read the question to the class and present an answer.

That developed into the survey, simply by collecting all the questions together and distributing them to the two classes,

actually, to several classes in Sydney through several semesters (where there was open laughter over both questions and answers), and to one class in Bradford (which seemed to take them more seriously).

The answers came out as above with reasonable consistency, class by class, and the Australian and English answers were very similar. That similarity was surprising because:

- There are general national differences between English society and Australian society,
- The Australian classes were a mixture of sandwich and part-time students, all of whom have had work experience, but the Bradford system runs full-time study with a work-placed semester that would occur after the subject in which the questions were presented,
- The Sydney student body was composed, largely, of a mixture of some with multi-generational backgrounds, some from families that arrived post-World War 2 (generally European), and some from recent migration (generally from the near-north), but the Bradford students were a mixture of *original* English, some from Indian/Pakistani families that had entered the country post-World War 2 and some from Europe, the Middle East, as far as Malaysia, just there as short-term students,
- The Australian student group had a strong majority of males, with only two or three female students per class, but at Bradford about one-third of the class was female, many of whom were from the Middle East.

This informal investigation revealed that the great majority of the students (over 90%) gave answers that were *right* in the sense of being fair and just. An example of a question and general answer, based on the author's history, is as follows:

You are a factory manager and you hear on the grapevine (it is, of course, only gossip, but passed on by someone usually regarded as a reliable source) that one of the young women is working in an evening hospitality industry, after office hours.

The students readily picked up what was inferred, and the answer given by a majority is summed up as: *If her work is not being affected, ignore the gossip, but try to track it down to the truth and stop it.*

The students found their answers were justified by their being told what had happened in real life. Yes, an office girl was working after hours, in fact in the Union café at the University of New South Wales, so the story was true, but whoever started it around the office put an inference to it that was quite incorrect. The manager involved did not find out who started it and simply told the truth to a few, which killed the rumours.

A later and more structured survey found responses to be varied, and depended on *which hat*, for example, engineer or manager, the student was expected to wear when answering the particular question [28].

What can be concluded from the survey results? Is it possible that there is some underlying, internalised, system of ethics that *human nature* provides? Probably, but if so, is it by nature or nurture?

May it be concluded that engineering students, having a mindset suited to the technical disciplines, are naturally *ethically-minded*? Possibly, but the results showed slightly more concern for people than for task.

Is it possible that the answers were so reasonably uniform because those answering had not been educated, perhaps one might say *contaminated*, by the need to compromise with their employing organisations' political influences? Possibly, but there has been no opportunity to compare-test older engineers.

We do not know, but finding so many junior engineers could answer these situations fairly and justly was very gratifying.

So should an ethics subject be included in an undergraduate curriculum? It is believed that there is no need for a complete subject, but ethics, with reference to the IEAust Code, should be included within any engineering management subject.

ACADEMIC ETHICS?

The National Tertiary Education Union (NTEU) has issued a Code of Ethics that covers principles related to teaching, supervision, research, counselling, administration and work-place relations, many of which the author has observed breached [29]. In addition to observing all these general aspects of living and working ethically in the tertiary education environment, academics (including students) have a distinct ethical obligation not to indulge in plagiarism, ie using the work of other writers without acknowledgement.

This aspect of ethics has received attention during the last few years, in the daily press, due to migrant students being found to have copied from texts and other documents without citing their sources. Their reasoning, apparently, is that such action is acceptable in their society, where copying from one considered to be an expert is a compliment to that person, which presents Australian (and, no doubt, English and American) academics with resolving the differences between different cultures. The only answer seems to be to quote the adage: *when in Rome do as the Romans do.*

The author has had an experience with a student being guilty of plagiarism, and the case not only illustrates that, but also the problem of being ethical in the sense of being humanitarian as well as serving justice. When reading a student assignment, handwritten, two identical lines of writing were found, suggesting that the student had lost concentration briefly and had repeated himself. Perhaps the repetition stimulated memory because checking another student's work found exactly the same answer, so the student who had copied was confronted (privately) with what had been found. Of course, he could have been reported and could have been given a fail in the subject, but he admitted guilt and promised not to copy again.

One might say that the author was unethical by not following the rules. Or, one might say, as the student was in his second-last year, said he had not engaged in this before and would not do it again, then giving him a dressing-down warning was reasonable; this latter is a response to what was seen as a response to perceiving a *higher purpose*, as suggested by both Garrett and Higgins [4][5].

That incident illustrates a prime difficulty in applying ethics to conduct. There are no simple and straightforward answers,

and what may appear to be fair and just to one person who is totally rules-driven may be unacceptable to another with a more liberal attitude to human frailty. This is indicated by Eells and Nehemkis in their stating that what is ethical to one may not be to another [8]; just as (to use another old adage) one man's meat is another man's poison.

SUMMARY

Through the above, the following has been covered:

- How the topic of ethics became interesting;
- General definition and application of ethics;
- An ethical paradox;
- The application of ethics to business;
- The application of ethics to engineering;
- A model of engineering ethics;
- The teaching of ethics to students;
- The application of ethics in academia.

CONCLUSION

As a principal conclusion, from studying the literature and from observation, there seems to be no doubt that the philosophy and application of ethics is an essential part of human life. Without an ethical framework, individuals and groups, corporations, nations, whatever, can act in ways that may be detrimental to society as a whole.

Engineers, as members of a profession, whether members of the professional society or otherwise, have a responsibility to balance the technical, professional and social aspects of their work, to both benefit society and do no harm to society.

The time to begin building an understanding of ethics is at the student level, by informing students of the IEAust Code. Nevertheless, it is recognised that ethics, however taken, is a very slippery subject, and inevitably raises more searching questions than satisfying answers.

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