
Overcoming the Anachronistic Divide: Integrating the Why into the What in Engineering Education*

John Hinchcliff

Auckland University of Technology, Private Bag 92006, Auckland, New Zealand

Technical expertise in the abstract fails to account for the crucial contexts in which we operate. Subjects such as philosophy and psychology can be as technical as engineering and science. It is important for the future of our society and our professions that we determine an ethical base for our education and our employment practices. A professional needs to recognise the why dimension as well as the what in order to provide a wisdom and understanding. Also, for the profession to attract students there needs to be an enhanced community respect for engineering. This can be assisted if we integrate a person-centred and nature-respecting ethic into engineering education. As educators, we are encouraged to learn more and more about less and less until by logical progression we learn everything about nothing. Not being a wonderful academic, I do not know a great deal about nothing but hopefully a little about something. This something for me is probably next to nothing when its focus is engineering. And our collective something is reduced to a little more than nothing when we recognise that our cosmos is at least 15 billion years old, that *Homo sapiens* can claim about 150,000 years, and that our personal pilgrimage into intellectual sophistication is no more than two or three score years. So I hope my little antipodean Friday evening something will resonate somewhere and allow for some guilt by association.

INTRODUCTION

Someone said of Presidents: *It is lonely at the top but you sure eat well.* Thank you in advance for a pleasant dinner. Thank you to my esteemed colleagues, Professor Roy Geddes and team, for your involvement.

Except for conventions of bankrupt undertakers, after dinner speeches are supposed to be light-hearted on heavy bellies. Since we are not equipped with the heavy bellies and since it is before dinner, I am caught between the proverbial dog and the tree. I'll talk fast to make the thirty minutes go more quickly. Perhaps I should talk slow to spread it over my little something.

The Mexican revolutionary Pancho Villa lay mortally wounded on the field of battle. His last words to his aide were: *Don't let it end this way. Please tell them I said something.* So I must say something. And I listen to Churchill who said: *It's no good doing our best. We must do what is necessary.*

* Speech presented at the Conference Banquet of the 2nd UICEE Annual Conference on Engineering Education

Why?

A student telephoned me one beautiful spring Saturday morning: *I have cut my wrists. Why should I stop the bleeding? Why indeed? Why live? Who am I? What can I believe in? What ought I to do? And why?* The media and the moguls pump out prosaic answers such as prozac, psychological profiling, football, a new car, the best vintage wine. But these answers do not satisfy the quest for meaning of either the body piercing grunge afficianado or the privileged professor of engineering.

Many have revolted against traditional values such as God, Queen and Country preferring the individualistic values: *Do your own thing – as long as you do it authentically.* So the crooner sings: *What's more than this, I did it my way.* Is there now only my way?

So who can answer?

The revolutions of Western thought have left us exposed. Copernicus took us out of the comfortable and homey universe with God just out there in the Empyrean heaven and left us shivering philosophically in that unbelievable, unimaginable enormity of the

cosmos. Darwin suggested we are nothing really special in creation – merely part of a haphazard process of biological survivalism. Freud questioned our rational abilities. Cybernetics suggests the machine can think and remember better than we can. And I understand the robots want to drink our beer. The Meta-industrial Information Age is creating its own *technological intoxicification*. *The word has come down from the Dean that with the aid of the thinking machine King Oedipus Rex learned all about sex without ever touching the Queen*. Nietzsche said: *Since Copernicus everything has been falling to an X*.

Cain built the city Enoch for security to hide from the Infinite. So we seek security by building our towers, by protecting our possessions, and by hiding in our obsessions. We want our scholars to be omniscient, our doctors to be omnipotent, our engineers to fix up everything, and our media to titillate. In this process of objectification or thingification the good life is all-important and the good life forgotten. So we lose our sense of being. And too many of our young despair.

We see the billions poured into weapons for the military. Various possibilities of biological, environmental, bacteriological, and nuclear holocaust cast a lurid light over technology and we attend the theatre of the absurd and find *a picture of a world that has gone mad*. And some young students say I don't want to do engineering.

Some pessimists argue there is nothing we can do other than fidget and nitpick within the routine of our ostracised containment. Our nightmares will not go away, and our consciousness will not be appeased by anything we can do. We are imprisoned by the machines and our institutions. So Toffler when asked to justify his lavish lifestyle when there are so many serious problems with our civilisation said if you are on the *Titanic* you might as well go first class.

Einstein said: *We live in a day of perfect means but confused goals*. Thus, Albert Speer could design buildings for Hitler while refusing to be aware of or share any responsibility for his evil. Thus, Enrico Fermi could say to the inquiring reporter after successfully detonating the first nuclear device at Alamogordo, New Mexico: *Don't trouble me with your moral scruples. This is such beautiful physics*. Thus, the men who staff the missile silos containing US Inter-continental ballistic missiles are deliberately not told the targets for which the programs are targeted to prevent the soldiers from putting the target into its human context. If they learned that their missile was aimed at Moscow they might happen to read about that city and find that it is inhabited with ordinary men, women and children. The ignorance of the

decontextualised technical specialist is deliberately sought. Thus, Professor Calder could say that the Hiroshima bomb was the greatest evil because the scientists and engineers not only did not know but knew they did not know what it was for.

What?

Edmund Husserl, in his *Crisis of the European Sciences*, explained that science was in serious danger of being rejected because of its indifference to values.

What, men are asking with growing impatience, are the sciences saying to us that matters in our present time of trouble? And the thundering reply is Nothing – that is directed to our deepest needs!

And this same judgment can be applied equally to Humanities. I majored in philosophy when it was captured by the ideology of logical empiricism and reduced to the technique of language analysis. Ethics was largely ignored as an irrelevant hangover from a haunted medieval world. The personal search for meaning was not real philosophy. Philosophy aped science precisely because it was value free, neutral, pure, objective and context free. So, also, it has been proclaimed that the business of business is business, that sport is for sport's sake, and art is for the sake of art.

So philosophy and other disciplines in the Humanities wilfully and proudly stood on the *what* side of the divide.

Engineering, during my university days, was on a different campus and apart from the feats of the haka party during capping week. Our two isolating kingdoms of learning failed to connect with each other. But both philosophy and engineering belonged to the kingdom of the *what*.

Integration

Fortunately, during the seventies, Auckland University's Engineering School introduced liberal studies and I believe it has thrived ever since. And the anachronistic divide began to be bridged. Now most professional schools include some liberal studies and many professions have Codes of Ethics. So the pendulum has been swinging.

My first research grant as a lecturer in philosophy was to write a paper entitled *The Theo-Political Logic of Benedict de Spinoza*.

I decided the result was irrelevant to my undergraduate teaching and irrelevant to the search for meaning. Only two or three Spinoza scholars would be interested in reading it. Even today, 99% of

academic journal articles are read by 1% of those who bother reading the journals. The Vietnam War was raging. The students were rapt in their sport. So I threw away Spinoza and researched the philosophies of war and sport. As an educator, my responsibility is to my students and their needs.

And, ever since, I have sought to ground my understanding of the Humanities to make sense of the practical realities. I welcome the pedagogical orientation of the Auckland Institute of Technology because it seeks to integrate the technical with a contextual understanding. We use the word *technological* in our title. *Technos* meaning art or craft and *logos* meaning wisdom. So it is not just skill that we are interested.

We are not interested in turning the study of culture into the study of the study of culture. Normative ethics are more important than meta-ethics. We interpret theories rather than develop theories of interpretation. We learn a language in its context rather than about a language in its theoretical construction.

We need to emphasise that our engineering and our philosophy, our sport and our commerce are transforming our world with a value system which has not been sufficiently examined.

Our disciplines and institutions are progressing like marvellously technical jet aircraft. They have powerful engines and make great time which can be measured to perfection. But where are they going? And, why? When these questions are answered there is point and purpose.

Many are now calling for a re-evaluation of technology and the institutions of our society. Possibly, the dramatic threats of holocaust by the megamadness of the nuclear arms race, by the acid rain, by Chernobyl, and the hole in the ozone layer, have finally woken us up to questions concerning our obligations as citizens for what is happening around us.

There is now a widespread recognition that neither science, nor technology, nor philosophy can provide appropriate value structures. We are heeding the words of James Thurber who said:

Man is travelling too fast for a world that is round. One day he will catch up with himself in a great rear end collision and man will never know that what hit him from behind was man.

On the office desk in a French Hotel there is a notice: *Before going to your room please leave your values with the receptionist.* We must not leave the study of values in the cloistered ivory tower. Nor must we bury them within a technical fix. We need to bring them into the market place to give them transformative power.

The bride-to-be asked the shopkeeper for forty yards of material for her wedding night gown. When asked why, she said: *We are academics more interested in the search than the discovery.*

Academia still occupies a position of privilege albeit of diminishing respectability. So, we in our workshops for the chronically gifted have a precious opportunity to make a difference and offer assistance in the quest for meaning.

Thus, with our students and each other we should examine the beliefs of our society and profession. For example, there are the following:

- The *technical fix*, that is, technical expertise can solve any problem.
- *Invention is the mother of necessity*, or whatever can be done must be done.
- Personal wants are elastic and so economic growth is essential to satisfy them.
- Self-seeking behaviour will lead to social good through the operation of the invisible hand.
- It is more difficult to change human nature than to develop technical solutions to solve social problems.
- Knowledge is power.
- There is nothing we cannot know.
- Technology and science are neutral, value free and objective.
- Western civilisation is supreme.
- Order, control, structure, logic and reason are the key management values.
- Success depends upon being competitive.

The first Law of Holes says if you are in one you should not keep digging. It should now be self-evident that these values will not help us find our preferred future.

Herbert Muller said: *We are giants technologically but pygmies morally.* C.S. Lewis said: *Each power won by man is a power over man as well.* T.S. Elliot: *Where is the wisdom we have lost in knowledge?* These sentiments are being echoed by more and more by people.

We hear warnings from scientists and engineers themselves. For example, when Joseph Weizenbaum, Professor of Computer Science at MIT, urges a program of technology detoxification we are most likely to listen. When Herbert York, Chief Military Adviser to Eisenhower and Kennedy writes a book called *Race to Oblivion* we listen. We know these men cannot be dismissed simply as trendy lefties.

When Winston Churchill says that *the dark ages will return on the gleaming wings of science* we

listen. Einstein speaks and we listen. His famous words: *Since splitting of the atom everything has changed but our way of thinking and thus we drift towards unparalleled catastrophe* hit hard. Professor Max Born, teacher of Oppenheimer and Teller, regretfully concluded on his retirement that he should have taught his student ethics as well as physics. On his retirement, Admiral Rickover, began complaining about nuclear weapons. President Eisenhower, in his retirement speech, warned the United States of the *unwarranted* influence of the *military-industrial complex*. Leading the opposition to the Trident submarine program was engineer Robert Alderidge who was formerly head of Lockheed's design team for the MARV missile. And Professor Julius Stratton said at the Massachusetts Institute of Technology centenary celebrations:

Only our will for right and wrong stands between us and disaster. We must seek salvation not by withdrawal from the quest, but in man's conscience. Science gives us knowledge and power. It tells us what we can do; we must turn elsewhere to learn what we ought to do.

Values

Many of us now accept that we need a set of principles or Code of Ethics in terms of which we can be held accountable for our actions. Our code of ethics declares strategically the intention of our profession that we, the members of our profession, will act responsibly and for the benefit of society.

I would describe three of the principles I believe to be crucial. First, Respect for People is the keystone for many ethical codes.

The technical fix, it is widely alleged, causes us to lose sight of other people, as people. Our infatuation with the technical sometimes allows us to voluntarily degrade them. For example, dying, which should be our most intimate social and personal experience, can be dominated by the company of defibrillators, aspirators, oxygenator, catheters and the intravenous drip, deep within the recesses of the hospital. All too easily, family and friends are excluded. In modern nuclear warfare the processes have become so technical that the human is almost redundant. After the President has said *Go*, the computers and complex electronic gadgetry take over to create the unimaginable holocaust. There is no time for parades, speeches, farewells, prayers, heroes or burials. There is no time for people. The machines of the physicists and the engineers push us into oblivion.

The Moog synthesizer may play more perfect Mozart, but the expert says the personal interpretation of the pianist is a vital factor. We may turn to technical guidebooks in search of the knowledge that will help us gain sexual satisfaction, but the psychologists say that there is an inverse proportion of satisfaction relative to the number of such books read.

Eli Wiesel, philosopher of the Nazi Holocaust, complained: *The Holocaust teaches us nothing*. Because we leave the person who suffers out of the picture and because we attempt to comprehend the event individually, objectively, logically and rationally, we seem incapable of internalising its shocking reality, and fundamental evil, and it does not become a part of our personal experience.

As teachers and learners, we need to ensure the realities of our personal experience, including our intuitions and passions, are neither fictionalised, nor betrayed, nor diminished, nor hidden by the coldly technical answer but given full focus.

This is the level of human tragedy, of joy, of beauty, of play, of love, of dialogue, of meaning. So, in our technical teaching, we must recognise the mystery of our humanness, which is grounded in the subjective. For this we need the poets, prophets and artists to give us a healthy dose of reality therapy about living with the challenges of being fully alive as fully human.

So our psychotherapy students could glean a useful understanding of the human condition by reading Dostoyevski as well as their technical psychology textbooks. So our engineers could learn about the society they will shape by taking history, ethics and liberal studies.

Respect for Nature is a second key value. As you know all too well, each time we pollute the earth or irresponsibly exploit its natural resources it becomes diseased, poisoned, and emptied of its vitality. Irwin Chargaff, Professor of Biochemistry at Columbia University, said

my generation ... has been the first to engage, under the leadership of exact sciences, in a destructive colonial warfare against nature. The future will curse us for it.

Unfortunately, the parable of the prodigal son seems appropriate to our actions. We have carelessly wasted our substance. The result of our affluence is effluence, and the result of our effluence is environmental destruction. We must learn as engineers to walk gently upon the earth with reverential care.

We might recover the word *nature* and use it instead of *environment*. The word *environment* indicates something that is *out there*, something separate from us, something alien, something mechanistic and

purposeless that we can master and manipulate. Nature suggests vibrancy. It suggests our participation in, or our kinship with, a living cosmos. Some are saying that we cannot expect the engineer to find a reverence for nature. It is a crucial responsibility to prove that charge is in error. Similarly, with our economists. The word *economics* derives from *eco* meaning home and *nomous* care for.

The Ethic of Holism is a third potential pillar in a Code of Values. This recognises the contextual principle that *no part can be defined or understood save in relation to the whole*. Nature and society and ourselves must be seen as integrated with all things interdependent, and *the whole is always greater than the sum of its parts*. A technical assault against one part of the system can create a chain of disruption, the consequences of which may be impossible to predict, control, or rectify. As Barry Commoner affirmed: *Everything is connected to everything else*.

We have been programmed by our education to shred any vision of the whole and concentrate on a part in abstraction from the whole. Therefore, we ignore the many contexts.

The prophets of today call us to overcome this reductionism, to pledge our loyalty not to a multiverse but to a wholistic universe in which the parts are interrelated and thus to inspire the relationship of care.

My limited understanding of quantum physics informs me that we have a philosophical justification to connect *theoria* and *praxis*, the thinking and the acting, the part and the whole.

The quantum physicists challenged the technical, lineal, and rational presuppositions of classical physics. Energy, activity, and process relating to interactions and interconnections became the essential focus. Heisenberg, influenced by the Indian poet Tagore, recognised both the relative transiency and interrelationships of reality in developing his Principle of Interdeterminacy.

Fritjof Capra, author of the *Tao of Physics* and deeply influenced by the paradoxes of Zen Buddhism and Taoism said: *Nature does not provide any statements. She just provides the riddles*. We gain understanding by participating in the *dynamic interplay* of interactions and interconnections. We understand more when we share together our experience and our wisdom.

Capra writes that *the unification of concepts which had hitherto seemed opposite and irreconcilable turns out to be one of the most startling features of this new reality*. Co-operating is given philosophical justification.

So this paradigm shift encourages engineers to co-operate with philosophers and professionals from

other disciplines to share perspectives and find a new synergy that enables a further partial understanding.

Albert Einstein said: *We must learn not only to tolerate our differences, we must welcome them as the richness and diversity which can lead to true intelligence*. A dynamic and progressive culture thrives on the creative integrating and connecting of diverse contexts. So the ordinary must be related to and challenged by the extraordinary, the traditional by the innovative, and the usual with the unusual, the philosophical by the engineering, the why by the what, and the what by the why.

Thus, we shift away from entity thinking to event or process or relational thinking. Thus, we embrace with confidence the interdisciplinary and the holistic.

This is a message of liberation and action. We have the right, indeed the obligation in terms of the nature of things, to challenge the basic mindsets, the myths, the structures and the institutions within which we operate.

Because many of us locate in powerful corporate structures, we are able sometimes to make a significant difference. But we will need encouragement and courage to break through any enslavements of the bureaucracy and any tyranny of the establishment. But our obligation is to *blow the whistle* against any procedure or machine that is being developed which is not in the best interests of society. This is the fine art of *conscientious dissidence*. It is not easy because it often involves a risk. This can involve considerable personal and professional sacrifice. There is that Law of Probability Dispersal: *whatever hits the fan will not be evenly distributed*. But as Koestler said: *We are guilty of treason in the eyes of history, if we do not denounce what deserves to be denounced*. We should always remember that: Dogs don't bark at parked cars. If we do not want to be criticised, we do not need to do anything.

Thus, I believe that engineering education fails when it is merely technical, objective, measurement focused, lineal, standardised, atomised and conforming. It cannot deal with life's mysteries, perplexities, paradoxes. We need the co-operative involvement of the artists, poets, visionaries, and philosophers to extricate us with new and challenging symbols. And, we in the Humanities, need engineers to teach us how to be active rather than passive, connected rather than obtuse and grounded in the adventures of reality rather than lost in the esoteric realms of isolating theory. We need all of us to challenge all of us to become morally perceptive and conscientious citizens.

We need each other to challenge with our different perspectives and we need to grow with each other

together in wisdom even though it be through conflict. In this process we may risk our status and prestige. We certainly will risk being wrong. For the sake of our profession, and for the sake of our children's future, we cannot risk silence and acquiescence.

BIOGRAPHY



Dr John Hinchcliff has been the President and CEO of the Auckland University of Technology since 1984. Previously he has been Head of the Department of Humanities, Journalism and Media Studies, Royal Melbourne Institute of Technology, and

Chaplain, University of Auckland; he has also held various positions as Assistant Professor of Philosophy and Lecturer in Ethics, in the USA as well as Australia.

Dr Hinchcliff has received a number of honours and awards, including: Royal Overseas League Scholarship for United Kingdom, 1958; Royal Foundation Fellowship to Hebrew University, Israel, 1963-64; Commemorative Medal, for services to education, 1990; Prize for Best Paper, World Futures Studies Federation Conference, 1993; Officer NZ Order of Merit, for services to education; and Distinguished Alumnus Award, Drew University, 1998.

He has published numerous articles and conference papers, and edited several books, on ethics, disarmament, sport, philosophy, religion and education; most recently authored *Values Integrating Education*, Mirilea Press, 1997.