

A Peace Paradigm for Engineering Education: A Dissenter's View

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Abstract

Proposed modifications to ABET Criterion 3 are described which are based on a peace paradigm for engineering education. The *Integral Model of Education for Peace, Democracy and Sustainable Development* developed in response to the *Earth Charter* is used as a basis for the implementing the model in engineering education. Examples are provided for beginning an implementation of the integral model into engineering courses.

Introduction

Former Massachusetts's congressional representative and Jesuit priest, Robert F. Drinan, suggested that to serve as a university faculty member is, in his words, "to be a member of the priesthood of the intellect."¹ At its best, what values can we ascribe to such a community of scholars? Some that come immediately to mind are: selfless service to the greater community and the common good as well as contemplative action in pursuit of peace and justice. Yet today, in my view, such ideals are sadly lacking from engineering education. Rather there is an ever-tightening knot linking the university to corporate interests and an ever-increasing emphasis on developing "exit-skills" in our students that will help propel them to make even greater profits for their employers. Yes, there is a reference to the value-laden dimension of the engineering profession, its effects on the environment, society and the globe. These concerns are addressed in Criterion 3 and 4 in the most recent Accreditation Board of Engineering and Technology guidelines.² From my personal experience as an engineering educator, Criterion 3 and 4 are the most difficult to accomplish and document. Also from my experience, while every school must pay attention in principle to these criteria, an adequate addressing of some of the issues raised by the two criteria seems as an afterthought for many faculty members. Even more troubling is the almost enthusiastic tone that many general engineering publications have taken in describing the advanced weaponry and technological wizardry displayed by the United States and its coalition forces in the ongoing war in Iraq. Over the course of the last several decades, there has been much discussion of the need to move engineering education from a teacher-centered model of learning to a student-centered model. I would argue that equally as important is a movement towards a paradigm of peace.

Today the tragedy of the war in Iraq continues to unfold with an increasing number of lives lost both by combatants and innocent civilians. The financial costs of the conflict are staggering as are the impact upon the health of the local environment. In fact, we have no way of judging what will be the cost to the health of the planet as a whole. Recent articles in engineering trade journals extolling the wondrous technical gadgets at our disposal have troubled me deeply, and in fact, have motivated me to question my roles both as a researcher and as an engineering educator. My concerns and doubts were exacerbated by the tone of a recent engineering ethics conference. I felt certain that a forum in which engineering ethics was the focus would be a safe haven for those who may be questioning their unknowing or unwitting participation in violence. Though there may have been some in the audience who felt similarly, the conference keynote addresses were dominated by one particular point of view, one that is best described as absolutist and *pro status quo*.

Am I arguing that no weapons should ever be produced or used in the face of evil dictators such as Adolf Hitler or Slobodan Milosevic? No, I am not. Nor am I arguing for pacifism. I am arguing for a careful treatment of the causes of the war, and even more, a careful documentation of the costs of war if the weapons of war are to receive the fanfare afforded to them in the engineering press. Showing “smart” bombs striking their targets with incredible precision is only half the story. The devastation that results both to the inhabitants and to the environment merits equal consideration.

There is growing consensus in the engineering community that engineering is a value-laden profession with a strong ethical dimension. Evidence of this increasing awareness can be found in many different places from its increased emphasis in the ABET criteria to the establishment of an engineering ethics committee within ASEE to the increased attention paid to the codes of conduct published by various professional engineering societies. To date, I have found no explicit reference to peace either as a desirable end or a useful means to achieve some other end. Consider, for example, the code published by the National Society of Professional Engineers.³ Article I in the NSPE Fundamental Canons exhorts engineers to “hold paramount the safety, health and welfare of the public.” Critics might contend that such a statement includes working towards peace. I would respectfully disagree. It seems comparable to the once common argument that the pronoun, “he”, magically and mysteriously included women as well. It is not my intention to anyway single out NSPE as I have the utmost respect for their contributions. A similar observation can be made after careful consideration of any of the codes offered by any of the professional engineering societies. Consider the ABET criteria as well, particularly Criterion 3 and 4.² In Criterion 3, there is a veritable laundry list of issues deemed important in the practice of the profession from safety to environmental impact to the societal and global contexts of engineering design decisions. Still, no mention of peace is ever made.

With these experiences and observations, I began my search for a different paradigm for engineering education, one that put peace as an explicit goal, one that did not assume or presume that the reader would somehow identify it as part of the code of conduct. My search has identified one such model that will serve as the focus of the

present work. It is termed the *Integral Model for Peace, Democracy and Sustainable Development*.⁴ The model is described in some detail in the following section.

The present work seeks to offer an alternative paradigm for engineering education, using the criteria set forth by ABET. Modifications will be proposed for Criterion 3 in the hopes of generating dialogue concerning the direction that engineering education is taking at the start of this millennium. The modifications are based on a paradigm of peace, one that includes three components: (1) peace with oneself; (2) peace with others; and (3) peace with the planet.

Background of the *Integral Model*

In June 2000, an international conference entitled “Connecting Ethics, Ecological Integrity and Health in the Millennium” included one particular presentation, which focused upon what was termed by the authors a peace paradigm for education.⁴ The model, the *Integral Model of Education for Peace, Democracy and Sustainable Development*, adopted from the Earth Charter described three components needed in the shift. The three components describe the three fundamental interrelationships which form the contexts of our lives: living with ourselves, living with others, and living with nature. Each of these three relationships can be characterized as being marked by violence or by peace. In turn, each of the three relationships can be further subdivided into different dimensions or levels of expression.

Living in Peace with Ourselves

The interrelationship, living at peace with oneself, is subdivided into levels of expression corresponding to living at peace in the body, in the heart, and in the mind. Having peace in our body entails the development of an awareness or consciousness of our physical needs for health and a wise optimization of any/all satisfiers of those needs. Peace in our heart requires the meeting of needs that generate a sense of basic security and trust. Here it is necessary to cultivate qualities such as love, compassion and tolerance. Peace in our mind refers to the possibility of self-realization based on an ethical consciousness of universal responsibility, that is, an appreciation of one’s place in natural and human history, and understanding the interdependence of all beings in the universe, as well as the present day global challenges.

Living in Peace with Others

Living in peace with others has the main themes of a truly democratic culture, political and social participation, and health for all. Democratic culture encompasses the key elements of meaningful participation in societal affairs, a sense of responsibility and a sense of solidarity. Elements involved in political and social participation include a fully engaged and participating citizenship, an identification of the common good and an understanding of the principles of peaceful conflict resolution. Lastly, the third level or component, health for all, requires an understanding and practice of generosity, an

understanding of being itself as a guide for having and doing and a sense of economic security for all society with an absence of a fear of scarcity.

The translation of living in peace with others to the goals of democracy, political participation and health may be questioned in the following way: Are these truly universal values or simply the highest values embraced by Western civilization? How can we in the West be sure that we are not arbitrarily imposing these goals on non-Western cultures in order to remake their societies into versions of our own? I would suggest that though these are difficult questions to answer, perhaps the most important contribution we can make as educators is provide a forum within which students may wrestle with these issues.

Living in Peace with the Planet

Included in the concept of living at peace with the planet are an ecological consciousness, an understanding and commitment to biodiversity as well as an understanding and commitment to the maintenance of a natural balance. The use of the word “peace” to describe environmental care/stewardship is intentionally provocative. In my view the notion of care and stewardship presuppose a hierarchical relationship between humankind and the planet whereas peace summons forth a metaphor of sitting at a bargaining or “peace” table as equals. In turn, each of these three elements is further subdivided into three components. Ecological consciousness entails identity with the cosmos, an understanding and respect for evolutionary forces and ultimately a respect for life. Here the respect for evolutionary forces does not refer to the narrow view of “survival of the fittest.” Rather it calls on us to recognize that nature is ever changing, ever recasting itself, and to not seek to halt or reverse all such changes. This does not preclude efforts to protect endangered species per say but it does call for a careful consideration prior to intervention. Perhaps, after reflection, society may wish to preserve gray wolves or Bengal tigers through government action while not permitting continued dredging of the Atchafalya River Basin near New Orleans, Louisiana. Biodiversity consists of an appreciation for the roles of the various plants and animals, a commitment to the protection of species, particularly endangered species and a commitment to conservation in concert with the dynamic nature of ecosystems. Natural balance encompasses an appreciation of the integrity of natural systems, an emphasis on sustainable resource use as well as on the importance of ecological security.

1. A complete schematic representation of the *Integral Model* is presented in Figure

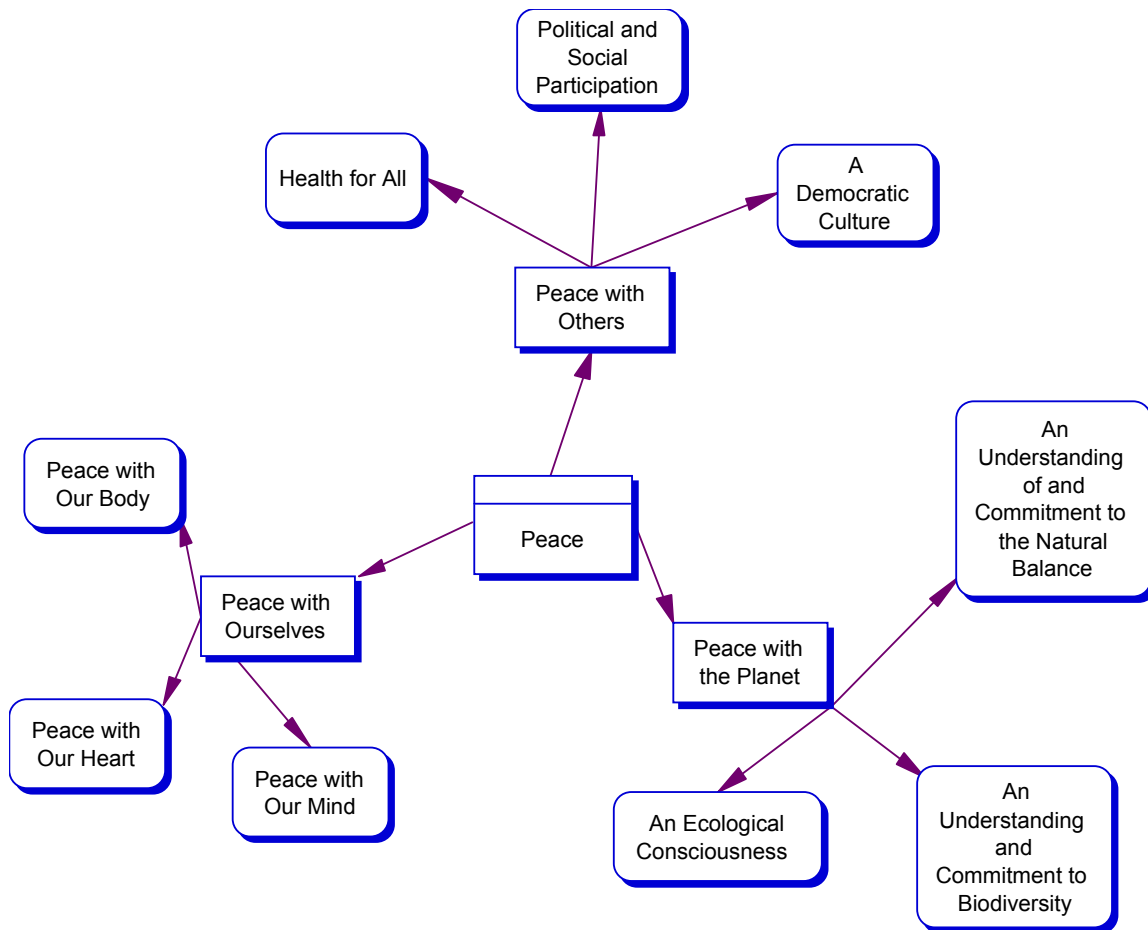


Figure 1. The Integral Model of Education

Integrating a Peace Paradigm into Engineering Education

Considering the existing ABET criteria, Criterion 3 focuses upon program outcomes. The modified Criterion 3 incorporating a peace paradigm with the changes typed in bold, *italics* may be written as the following:

Engineering programs must demonstrate that their graduates have:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs
- (d) an ability to function on multidisciplinary teams
- (e) an ability to identify, formulate and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively

- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use techniques, skills, and modern engineering tools necessary for engineering practice
- (l) ***promoting peace through the development of an individual plan for the life long cultivation of the qualities of compassion***
Here the whole idea of compassion is based on a keen awareness of the interdependence of all these living beings, which are all part of one another and all involved in one another. It is a call for caution and reflection upon the situations of others.
- (m) ***promoting peace through an understanding of other cultures***
Here the idea is to provide background information so that engineers when confronted with different cultures will have at least a beginning of an understanding of the possible origins or reasons for disputes.
- (n) ***promoting peace through an ability to employ the principles of peaceful conflict resolution***
Here the idea is to provide students with a formal algorithm for resolving conflicts much as we provide algorithms for solving engineering design problems.
- (o) ***promoting peace through an understanding of biodiversity and its importance***
Here the idea is to provide students with exposure to the important roles that different species play in the health of any ecosystem, and to move away from a mechanist's view of the planet and the universe as a collection of disparate parts.
- (p) ***promoting peace through an ecological consciousness***
Here the idea is to promote the understanding that the planet and all other ecosystems are constantly undergoing change and any attempts to interfere or redirect change may have serious, long-term, unforeseen consequences.

Final Thoughts

As I have been increasingly troubled by the tone that engineering education has followed in recent years, I have been searching for a mechanism whereby I can examine the courses, which I develop and teach in light of my concerns. For me, an adaptation and implementation of the *Integral Model* has provided me such a mechanism and has forced me into action. Since writing this work, I have carefully examined the courses I will soon be teaching and made some substantive changes. My plan is to carefully assess the effectiveness of the changes which I have put in place and report those results in a subsequent work.

Activities developed and implemented to date include:

- My effort to promote peace through the development of compassion has centered on an open-ended design problem assigned to students entitled, “The Compassion Practicum.” Students are challenged to do something that demonstrates compassion for another individual or group. They are asked to write a reflective essay on the entire experience and to make a short presentation to the entire class.
- To promote peace through an understanding of other cultures has focused upon participation in a “languages-across-the-curriculum” university wide program. Students decide on a foreign language, are assigned a language resource specialist. They then meet as a group for one hour per week for ten weeks and discuss articles from a wide range of sources including foreign newspapers and Internet sites. The discussions are both in English and a foreign language. This semester, there are groups in French, Spanish, Hebrew, Cantonese, and Italian.
- To promote peace through an ability to employ the principles of peaceful conflict resolution, required reading for all courses in which teamwork plays a part includes works by Katz et.al.⁶ and Nierenberg.⁷ Katz et.al. focuses upon management skills needed for communication and to resolve conflict while Nierenberg describes the art of negotiation. Students are asked to review their team efforts in response to the ideas proposed in the readings and submit a reflective essay.

The ideas I have put forth, though idealistic and lofty, represent my present day efforts to reconcile what I teach as an engineering educator to my profound hope that we, as engineers, may contribute in some small way to an increase in peace. In closing, a call for peace was put forth nearly a 1000 years ago on a hillside in Umbria, Italy.⁵ That call seems particularly relevant for today.

*Make me an instrument of thy peace.
Where there is hatred, let me sow love.
Where there is injury, pardon.
Where there is doubt, faith
Where there is despair, hope.
Where there is darkness, light.
Where there is sadness, joy*

References

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3. National Society of Professional Engineers, *NSPE Code of Ethics for Engineers*, January 2003.
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5. Leonardo Boff, and Phillip Berryman (trans.), *The Prayer of St. Francis of Assisi: A Messgae of Peace for the World Today*, Orbis Press, February 2001.
6. Neil Katz, and John Lawyer, "Communication and Conflict Skills", *A Peace Reader*, Paulist Press, 1987.
7. Gerard Nierenberg, "The Art of Negotiation", *A Peace Reader*, Paulist Press, 1987.