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# An Engineering Curriculum Nourished by Literature: A Dream or a Necessity?

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*Let me not to the marriage of true minds  
Admit impediments.*

—W. Shakespeare, Sonnet 116

Sometimes owing to a long western-cultural tradition of compartmentalizing knowledge, and sometimes only because of a common prejudice that it is a light or soft subject, literature has little or no place in engineering curricula in today's university education. Instead of concentrating on long-debated differences between the nature of the two academic disciplines, particularly engineering and literature, this article looks for a compromise—a common ground where the two disciplines can meet, interact, and act in harmony to create a better world.

How can an engineering student benefit from literature? Many important engineering problems require a wide range of problem-solving skills, including those that the literary perspective can provide. Otherwise, as Abraham Flexner said to the American Society of Electrical Engineers in 1919, “The narrow technical education makes the engineer just instrumentally proficient; only if his training extends out into the cultural tangle, will he get a voice in determining the lane that social evolution shall take,

only then will he be creator of the future and not merely a tool of the present” [1]. I suggest that this might be possible only in a “marriage of true minds” in a university education—i.e., in the marriage of the scientific and the literary mind in an engineering curriculum.

In 1959, when C.P. Snow delivered his famous speech, “The Two Cultures and the Scientific Revolution” at

opposition between the two disciplines by giving voice to his worries about this division between the two academic disciplines [3]. In return for Snow's hostility toward the literary community, Leavis claimed that literature is the only antidote to the cheapening and degeneration of human experience in the insidious and wicked hands of the dominating forces of modern mass society [4]. (Translations from Turkish sources belong to the author of this article.)

In fact, the Snow–Leavis quarrel was the reenactment of an even earlier, 19th-century controversy between the scientist T.H. Huxley and the poet Matthew Arnold. Huxley argued that science should have an important place in education, while Arnold looked for a compromise, argu-

ing that literature as an academic discipline includes the analysis of not only literary classics but also scientific classics like Newton's *Principia* and Darwin's *The Origin of Species* [5]. We can certainly count the number of such works in which the scientific vision and the intellectual vision intersect and allow us to discover the layers of meaning behind the verbal art, such as metaphor, metonymy, synecdoche, or paradox. An engineer, to decipher the meaning of such texts, has to apply a theory of literature in qualitative

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Cambridge University, there emerged a new argument on the uncompromising nature of two schools of thought—science and literature. Snow, with both his scientist and novelist hats, pointed to a wide crack between the scientists and the literary intellectuals and despised the literature community as intellectual snobs who had no idea about the second law of thermodynamics [2]. In his quick response to Snow, F.R. Leavis, a professor of English literature at Cambridge University, reacted severely against this

research, specifically, the discourse analysis. Therefore, according to Arnold, there was not an impassable gulf between the two disciplines, and both deserve a place in holistic education.

## DIVERGENT VERSUS CONVERGENT THINKERS

Having summarized the major points in the two-centuries-old debate between science and literature that western cultural history has witnessed, it would be right to now shift the focus to what literature can offer an engineering student. First of all, the word *engineer*, derived from the Latin *genium*, indicates a profession that requires intellectual, technical, and practical skills as well as talent, inventiveness, intuition, and innovative competence to translate or transform an idea into a solid product. Engineering, like literature, is an art, a creative act (design) [6], and literature provides engineers with different perspectives and new ways of critical thinking. Josef Rojter [7] refers to research done to investigate the thinking skills of engineering and humanities graduates, and he reported that humanities graduates have highly developed divergent thinking skills, whereas engineering graduates are more convergent thinkers.

Divergent thinking seeks multiple perspectives and multiple possible answers to questions and problems. Divergent thinkers generate many different ideas about a topic, breaking it down into its various components to gain insight about the various aspects of the topic [8]. After the process of divergent thinking has been completed, ideas are organized and structured using convergent thinking. This is a methodology of literary studies, and it is also how a literary mind works in the process of literary analysis. Since literature reflects the ambiguities, complexities, and perplexities of human life, the literary mind (the divergent thinker) tends to draw many analogies, ambiguities, and even unexpected connections, and he/she comes up with many possible answers or solutions.

Convergent thinkers, on the other hand, assume that a question has just

one right answer and that a problem has just a single solution. Therefore, convergent thinkers are less conceptual but more result oriented; i.e., they are more effective in setting the parameters of the problem and, in a mechanistic way, solving it [7]. Moreover, divergent thinkers are better at finding additional ideas, whereas convergent thinkers have a more difficult time finding additional ideas. What is more, convergent thinkers run out of ideas before divergent thinkers [9].

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Therefore, depending on the results of this research, it is possible to suggest that the engineering curricula can be enriched with a few introductory literature courses to provide engineering students with the basic principles of divergent thinking. Literature courses encourage engineering students to look at a problem or a question from many different, sometimes conflicting, viewpoints. After all, instead of one way to approach things, literature provides engineering students with many different lenses with which to look at the world around them.

## ENRICHING HUMAN EXPERIENCE

The second benefit that literature can offer engineering students is that it presents a wide range of human experience in the personality of literary characters in a novel, story, or a play. These characters are involved in various events, have different feelings and thoughts, and present various behavior models. Readers are required to judge, evaluate, and interpret these characters; in other words, readers are invited to see the psychological, social, political, or ideological motives behind their actions. In this context, the French philosopher Ricoeur

defined the world of a literary work in [6] as “the first laboratory of the moral judgement” because the world of literature gives the reader the ability to imagine and empathize with another person’s conditions, state of mind, happiness, or pain. In this sense, literature is a “powerful way of learning what the human facts are” [10], and engineering students have a lot to learn from the study of literature. As Lawrence Kimmel said, “Literature extends the possibilities and scope of human experience and understanding of relationships that vary in dimension and depth—that develop in their own ways broadly between the good, the bad, and the ugly” [11]. Furthermore, human experience is far more complicated than textbook problems, and, therefore, it cannot be captured by facts and figures only, and it cannot be expressed in terms of quantity. Therefore, the approach in literary studies is not quantitative but critical, analytical, interpretative, empathetic, and intuitive. So, through a literature course, engineering candidates can have the opportunity to cultivate a human-centered, analytical thinking skill and the knowledge that depends on intuition and empathy.

## TOWARD BETTER INNOVATIONS

Another advantage of including literary studies in the engineering curricula is that literature will allow the engineers of the future to gain new sensitivities and insights, new imaginative and creative powers, and a more sophisticated worldview and finally to develop keener aesthetic awareness and appreciation of beauty.

These are very important, even vital, to creating innovative and successful market products in today’s fast changing world. As I have stated earlier, an engineer is not only a scientist but also an artist (a designer) and a doer. Therefore, the modern engineer needs all these competences so that he/she can meet society’s needs as well as challenges and make greater contributions to humanity and civilization.

## ENGINEERING STUDENTS IN A LITERATURE COURSE

The fact that engineering students need all the previously mentioned competences and, therefore, that literature courses are a necessity for the engineering curricula can be exemplified by an engineering student's exam paper that I received for a literature course, which he must have taken to raise his grade point average. A convergent thinking tendency, a lack of empathy with the human experience, an understanding of the facts without comprehending the meaning behind them, and all of the other traits common among engineering students found their best expression in this exam paper. The paper was written in one of my introductory literature courses. During my first meeting with the students, I wanted to see (as I always do) how they would respond to a poem; in other words, how far their networks of analytical thinking could go when they read literature. The poem that they had to read was the following by William Wordsworth, and the instruction was: "What is this poem all about, and what does it tell you about life?" The reason that I chose this poem was because it lends itself to different interpretations, and therefore every student can come up with an idea of his/her own.

### A Slumber Did My Spirit Seal

A slumber did my spirit seal;  
I had no human fears;  
She seemed a thing that could not  
feel  
The touch of earthly years.

No motion has she now, no force;  
She neither hears nor sees;  
Rolled round in earth's diurnal  
course,  
With rocks, and stones, and trees.

The title and the first line of the poem tell us that the poet is in a sort of hypnotic or dreamlike state or in a fantasy world because "a slumber" sealed his spirit. Or is it just an illusion? Although death is not directly addressed but only implied throughout the poem, it seems to be about the death of a beloved, but we do not know whether she is the poet's

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daughter, mother, or lover because "she seemed a thing that could not feel the touch of earthly years" (line 4). Is she a goddess? Or where is the speaker? Is he looking at a statue of a goddess? Or because of the sudden loss of the beloved, is he in grief and unable to verbalize his agony?

In the second stanza, she is described as an inanimate being; she is as still and lifeless as rocks and stones; however, the word "trees"—the very last word of the poem—opens another possible interpretation that she is dead but a part of even a more grandeur force: nature. She has now become part of a natural world. The poem raises some questions, but they have no certain answers. Therefore, the reader is the meaning maker. Literary texts always contain blanks that only the reader can fill [12], and this poem is a good example of that.

Now let us see the answer of the engineering student:

- Stanza 1: The poet thought the lover would never die.
- Stanza 2: But she is dead.
- Result: Nobody is immortal.

It is evident that the engineering student takes the poem as a mathematical problem and formulates the facts that he gets from each stanza, writes them down exactly one under the other, and then, in the manner of calculating the result of a mathematical problem, he comes up with a straightforward answer or solution without comprehending the layers of meaning behind the facts, missing the spirit, and ignoring the meaning of the human experience (pain, agony) in the poem.

## CONCLUSIONS

This article is an attempt to demonstrate that engineering curricula need to be nourished by a stronger dia-

log with literary studies. As the marriage of the true minds—the scientific mind and the literary mind—gave birth to the European Renaissance in the 14th century, the intersection of these academic disciplines can create the next generation of engineers whose intellectual vision and sensitivity to human concerns are more refined than their former fellows.

## AUTHOR INFORMATION

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