

# WIP - Philosophy and Engineering – Communication in Brave New World

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**Abstract—** This research-to-practice WIP paper describes the project developed for a mechanical engineering program to enhance the new skills demanded by the work market. The main idea is to offer an elective course just in the first year of a mechanical engineering program, a course for 2 semesters. It is a way to offer a different element as philosophical discussions to provide a breeding ground for thinking “out of the box”. It is a way to improve the student’s use of critical thinking as a support for communication. It is expected the growth of this capability is necessary in a globally connected business environment.

**Keywords —** *Freshmen, Challenges, Knowledge, Literacy, Aristotle.*

## I. INTRODUCTION

The COPEC education research team has developed an engineering program with the main idea to insert as an elective course just in the first year of a mechanical engineering program a course for 2 semesters.

Regardless of the particular path the future engineer chooses to follow in the mechanical engineering field the proposed course aims to empower students with communication and creative thinking skills to perform with excellence in designing and developing an exciting product or system.

These are valuable skills that can be applied to launch careers, enhance the entrepreneurial mind, and discover new possibilities in the field.

When young people enter higher education, they begin a journey to become someone new. Philosophy has this transformative power. This aspect of higher education has received little attention in the processes of being and becoming.

Under this perspective, a hybrid classroom environment for example provides educators the possibility to have a deep influence on the way education is being developed. Educators have now ways to entice and foster students to pursue a career that is meaningful for them and to be the best, otherwise, it would be very difficult to survive in the work market. It also means that professionals can master their careers despite historical moments, no matter what.

The analytical tools to achieve their design goals can be enriched by the philosophic analysis of facts and needs

concerning society and purposes. Another aspect is due to the ability to overcome all constraints imposed by financial resources as well as the environment and others. Philosophy can enlarge the vision when needed to design, market, and produce a system. These are valuable skills that can be applied to launch careers, enhance the entrepreneurship mind, and discover new possibilities in the field.

After a discussion about the course, it has been decided to offer the course as an elective, which demanded a lot of effort to market it as a different and as a vanguard opportunity to enrich the student’s formation.

## II. PHILOSOPHY AND MAN

Philosophical thinking requires students to develop positions and defend them by using apt examples and thorough analysis. students learn to deal with multiple perspectives and synthesize different viewpoints to conclude. This type of thinking is very useful in dealing with complex issues and situations. It also enhances analytical and writing skills, which are essential for evaluating ideas and solving problems.

In addition to studying general problems, philosophy also deals with the principles of truth and value. It is used to understand the standards of evidence that other disciplines use to make decisions. It also involves the study of logic and epistemology, which have a direct bearing on the various fields of knowledge. In some cases, philosophy students may study specific areas, such as art history or political philosophy. In any case, philosophy is a vital part of everyday life.

Philosophical questions are the basis for school subjects. For instance, the nature of the physical world is the subject of metaphysics. It also deals with the nature of ultimate reality. Questions like: “What is real?” and “What is beyond the stars are discussed in the philosophy of mind. Both of these fields are closely related to cognitive science. Another area of philosophy is biology. This field considers questions related to epistemology and ethics.

The most appealing feature to look for in Philosophy classes in a mechanical engineering course is undoubtedly the eccentricity and has to do with the enrichment of abstraction [1].

### III. SOME OTHER REASONS TO STUDY PHILOSOPHY

Thinking critically the number one reason to study philosophy is that all people practice active thinking every day to solve problems.

Another reason, however, is the reduction of random and chaotic influence. The more one develops philosophically, the more it becomes possible to avoid being swept away by the chaos of opinion.

It is great to evaluate ideas. It reduces the kind of judgments that are sometimes discarded and that could be extraordinarily valuable if put into practice.

Besides Philosophy helps:

- to gain perspective on who the man is and gives a basis for reflecting on how and why human beings came to be the way they are;
- to explore topics with reason and humanity;
- to push the boundaries of what is known;
- to put all else into perspective: career, life, moral reasoning, etc;
- While logic is a non-contingent science, it can be difficult to understand without a basic understanding of philosophy [2].

### IV. HIGH EDUCATION PHILOSOPHICAL ASPECTS

Undoubtedly education is still a key factor for the economic success of a nation, as well as personal satisfaction, and social stability everywhere and for all levels of society, age groups, and subject areas.

Philosophical aspects of the present education environment however state that it is subject to the highly competitive economic environment work demands. It means that schools and universities are subjected to the interests of the work market dictated by the capitalist environment ruled by the private sector. The ideals of employability and entrepreneurship have the goal of forming free citizens as they are themselves self-bossed. Under this perspective, the competencies needed by present high education demand the formation of a professional whose main aspect is that s/he has to be capable to know how to apply eagerly the amount of knowledge that s/he has.

So, taking into account the present historical moment to prepare a professional means to prepare them for employability and entrepreneurship the main requirement besides the pertinent knowledge is the "know-how to be" which is the capability to develop personal skills that provide adaptability, flexibility, and problem-solving mind.

Under this perspective, educators are considered the ones responsible for the preparation of citizens according to the values, skills, and knowledge that the economy and society need.

Anyway, this paradigm of education busted by technology resources is shaping a different kind of education that needs a different kind of education environment that apart from philosophical discussions has to survive in this extremely competitive market and on a global scale.

It means a deep change in the role and profile of educators as well as programs. This change leads to the following aspects:

- Time for activities that integrate the several disciplines;
- Willing for learning altogether with the students and with the experience;
- Challenge the students with complex tasks that enhance them to mobilize their knowledge;
- To be aware that s/he is a didactic situation organizer and also a buster of activities that are meaningful and pertinent for them.

In this sense the role of an educator is not to transmit the knowledge accumulated by humanity; the emphasis of the educational action of educators is to provide the students how tools that help them understand the world and so to act on it [3].

Mainly now in this new context of a hybrid classroom environment, educators have a deep influence on the way education is being developed. Educators have now mastered the art of enticing and fostering students to pursue a career that is meaningful for them and to be the best, otherwise, it would be very difficult to survive in the work market. It also means that the professional has in her/his hands the possibility to master her/his career despite the historical moment and no matter the work market [4].

### V. HIGH EDUCATION 21ST CENTURY CHARACTERISTICS

The Knowledge Society is in a state of transition as well, with its shift to a Global Learning Society of continuous improvement and innovation. It is no longer the creation and dissemination of knowledge, but its acquisition, sharing, and collaborative collection that are the key factors of success when it comes to science, technology, and engineering. We are already observing a clear trend where learners are creating their playlists of specific needs. Students attend universities to be collaborative, creative, and flexible, and to apply their knowledge in diverse ways. Teaching staff will have to rethink their role, that much is clear [5].

### VI. TECHNOLOGICAL, DATA, AND HUMAN LITERACIES

The purpose of higher engineering education has always been threefold: personal development (cognitive, psychological, social, moral), preparation for sustainable employment, and to form a skilled and self-actualized citizen who can navigate a complex world (Council of Europe, 2007). Sustainable employability requires graduates to have a mindset of continuous upskilling and relearning. By accumulating experience, knowledge, and skills, acquired in earlier phases of study and career, particularly from different domains, they create the opportunity to further develop and demonstrate their work potential, including their creative impact. This needs a coherent ensemble of deep working knowledge of engineering and technology, including digital engineering literacy skills, interlaced with a broad range of durable skills, and competencies that are related to innovation, marketing, and services, with a strong sense of its actions and impacts [6].

## VII. CRITICAL THINKING

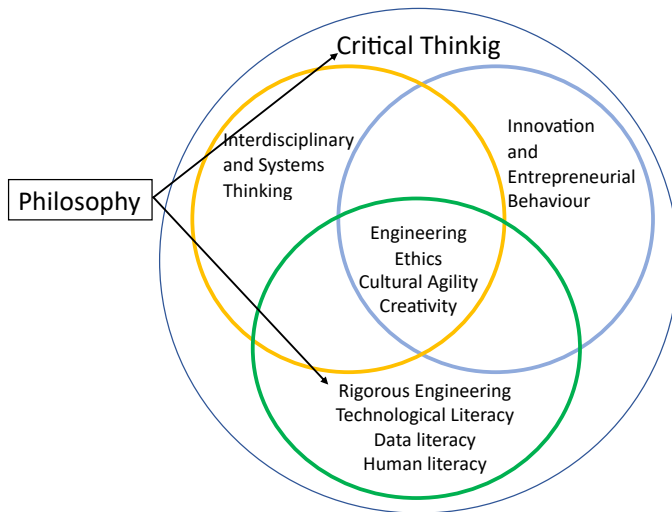


Fig. 1. Key aspects of a 21st-century engineering curriculum

A professional with critical thinking skills can be trusted to make decisions independently and will not need constant help. [7].

## VIII. WORK TEAM

COPEC Education Research Team has a history of courses and programs development for different programs mainly in engineering of programs for private universities.

It has had a considerable number of successes taking into account the variety of faculties and university objectives.

The COPEC - Science and Education Research Organization is constituted of scientists in several areas of human knowledge. Its members have embraced the mission of promoting the development of science and technology; they are all scientists who believe that education is the main beam in the construction of a better society.

It is an organization, which works have the goal to enhance and maintain relations between universities, institutions of education, enterprises, and the society of several countries not only for the discussion of education, technology, and sciences directions as well as to propose solutions.

It has a history of more than 20 years of existence. It is a group of scientists, teachers, and professionals, whose future vision impelled them for this work, which is growing and solidifying as a weight organization not only nationally as well as internationally [8].

## IX. IMPLEMENTATION METHODOLOGY

To choose the best approach for the implementation of the insertion of a new elective course it was necessary to take into account the engineering college aspects and demands.

Step 1 collects information about the college and the program.

- It is a private college, there were financial constraints, and 2 other universities offering mechanical engineering

programs. The tuition is similar in all three colleges, besides decreasing the tuition was not an option.

- After a search about the college expectations, the destiny of the engineers coming from this College, the trends of the work market, and the financial constraints the team started to work on one or two possible actions. This particular program prepares engineers for the work market and not to pursue an academic path. Looking at the trends the skills that are demanded for a successful career involve developing creativity, among others such as mentioned previously ethics, societal implications of engineering impact, etc.

Step 2 - To reach the goal to make an Engineering Program more appealing and keep rolling, the research team organized a proposal taking into account the probable future trends for careers with future. Engineering is one of them, as it promotes the welfare of humanity at every level, including health, economy, food supply, mobility, housing, technology, etc.

The question was what would make a difference in an engineering program more exactly, a mechanical engineering program? A program that could offer something else than expected courses like fluid mechanics and, chemistry, statistics, dynamics, differential equations, thermodynamics, materials science, circuits and electronics, and so on.

Step 3 - As long as the research about the future of careers relies not only on knowledge but also on creativity and soft skills Philosophy appeared as one probable possibility once it requires a good teacher and good content. After choosing philosophy for its characteristics and needed brain exercise, which are good for creativity development the team decided to present the proposal that was accepted by the competent engineering college representatives.

Step 4 - after presenting the proposal it was time to select the teacher and explain the goal of the course. To accomplish it a selection of teachers took place in a first moment based on CVs. As a second selection phase, the candidates were asked to prepare and deliver a class for the appreciation of knowledge and performance, chosen content, and teaching style.

Step 5 - The next step was the inclusion of the new course for the next semester. As long as it is an elective class and the students were in their freshmen years it was necessary to market among students. It had to be made by professionals and straight to the point - Betterment of career. It is all about new skills development.

Step 6 - The new elective course marketing. A professional enterprise was hired to do that, a local one because they know the cultural and social environment of the city where the university is.

Step 7 - Start the classes in person and observe how it was going in terms of quality of content and students' interest.

Observation - as the health constraints started in the 2020 first semester the next step was to offer the course 100% online. Coming back to in-person classes in 2022 the classes have been in person and some classes were available online as well as some

new content that the teacher considered important to reinforce the knowledge.

#### X. THE COURSE DETAILS

The classes are offered twice a week afternoon and evening time.

Regular length of classes – 50 minutes.

Some classes are available online.

The course provides an introduction to the science of the mind.

The main topics chosen by the teacher are:

- A general introduction to some of the main topics, texts, and methods of philosophy;
- Aristotle's major works, including, Physics, Posterior Analytics, Metaphysics, and Nicomachean Ethics;
- The Human Good and the Function Argument;
- Intellectual Virtues;
- Akrasia;
- Pleasure;
- Friendship;
- Aristotle and Contemporary Ethics;
- Followed by philosophy and everyday life;
- Moral and Ethics – reflexing and writing essays;
- An intensive seminar on a special topic in epistemology;
- What is the extent and nature of our knowledge of our minds? How do we gain knowledge through particular sources such as perception, testimony, memory, or reasoning? Introduction to decision theory - The Starting Point for Practical Reasoning;
- A questionnaire was given to the students when they enroll in the course. Another one at the end of the course. The goal is to measure the expectations of the students as well as their perception of what they have learned.

#### XI. QUESTIONNAIRE 1 (WHEN STUDENTS START TO ATTEND CLASSES)

Name	Student number
Program	Year
<b>Questions:</b>	
Have you ever taken Philosophy classes in high school?	
If Yes – do you remember anything that you have learnt?	
What do you expect to get attending these classes?	

#### XII. QUESTIONNAIRE 2 (WHEN STUDENTS FINISH ATTENDING CLASSES)

Name	Student number
Program	Year
<b>Questions:</b>	
Did you philosophize during the course?	
Has it helped to increase the perception of critical thinking development?	
Did you learn anything new?	
If Yes – can you pinpoint what you have learnt and that has been new and useful?	
Do you think in engaging in a Philosophy course to master your knowledge?	

#### XIII. THE COURSE EXPECTED RESULTS

The expected specific learning outcomes and competencies provided by the course are:

- Applied learning: students increase the capability to demonstrate what they can do with the knowledge that they have acquired.
- Intellectual skills: students increase their capability to think critically and analytically about what they learn, see, and experiment.
- Specialized knowledge: students increase their capability to demonstrate their knowledge about their fields of study.
- Broad knowledge: students increase their capability to transcend the typical boundaries of higher education and encompass all learning in broad areas through their solid

knowledge of basic sciences and specific ones fostered by the philosophy – of thinking critically.

- Civic learning: students increase their capability to respond to technical, social, environmental, and economic challenges at local, national, and global levels.

#### XIV. THE DISCUSSIONS

Along these years of classes which students are invited to participate and now in person classes style in fact has offered some interesting discussions have raised and the goal is in fact make students discuss and not only but take the core of the message that they get for their professional performance.

So, some questions have been raised such as: - are human beings the lords of technology? Or in a near future there will have a philosophy of technology where technology itself will try to understand both the practice of designing and the creation of devices and the nature of the created things. Other aspects have been discussed such as human responsibility facing decisions involved in projects of high impact on society. Among others of importance for thinking process for decision making once engineering work affects many people's lives.

The main aspect of these classes is to lead the future engineers to think critically.

#### XV. CONCLUSIONS

After 3 semesters of 2019/2020 in-person classes and 4 semesters of online classes, it has been successful once the number of pupils in classes, in person, has been good as long as it is elective and students have the habit of not perceiving this kind of class. Once they acknowledge the goals of the course, they give it a try and in general like it. It is a period of pleasure in some ways and also a period of opening the mind to some aspects of life.

Another aspect is that during the health constraints period with classes online, the number of students increased however no search for the reasons for this was made.

There is a group of the pedagogy education staff keeping track of the student's path after university and getting in contact to get the information about to what extent the Philosophy course has helped the professional performance in any way.

As long as it was considered a success the idea was to offer for students of other years of the program.

The implementation team has not received the report concerning this track. However, it is known that the course has been offered and still has a considerable number of students enrolling in it.

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