



VALUES AND COMPETENCES IN CHEMICAL ENGINEERING EDUCATION

Dr. Antonio Valiente Barderas.

Chemical Engineering Laboratory.

Faculty of Chemistry.

UNAM, C.U.

Mexico

ABSTRACT

In recent times, trends have been imposed towards making all levels of education follow the pedagogy of competences, although value-based competencies have been left behind. The author indicates that more emphasis should be placed on imparting values, so necessary in our countries, being essential to acquire skills that will serve for professionals to accomplish success in the 21st century world.

KEYWORDS: *Competencies, Skills, education, values.*

1. INTRODUCTION

1.2. - Education in competences.

We live in an age when knowledge applied to the areas of production, distribution and management is revolutionizing the economy, trade, the basis of politics, cultural communication and the way people live lives and consumption conditions. This new cycle has been called the "Knowledge or Information Society", because it is now information that is leading the emerging global economy. The social and work environments, influenced by the revolution of knowledge and the development of computer and communication technologies, has led to the need to bridge the gap between education and the world of work. This approach emerges as one of the answers to graduate students, due to the fact that they have a set of outdated knowledge and often do not respond to what is needed to act in reality.

Education is a process where the two activities are carried out: teaching and learning. That is why competence-based education is being promoted around the world today. The competence of individuals is derived from the possession of a number of attributes (knowledge, values, skills and attitudes), that are used in various combinations to carry out occupational tasks. In this way, a competent person is defined as one who possesses the attributes (knowledge, values, skills and attitudes) necessary for the performance of his/her work, according to the appropriate standard.^[1,2,3]

The main focus of education based in competences is performance, understood as "the concrete expression of resources that the individual places at stake when carrying out an activity, and that sets/establishes the emphasis on the use or management that the individual must do of what he knows, not isolated knowledge, under conditions where performance is relevant." From this perspective, what is important is not the possession of certain knowledge, but its' useful use. This approach obliges educational institutions to rethink what they have commonly considered as training. In this light, in order to determine whether an individual is competent or not, account should be taken of the actual condition, real performance conditions should be taken into account, rather than the formal fulfillment of a number of learning objectives that are sometimes unrelated to context.

The basic competences, also called key competencies, are the intellectual skills indispensable for the learning of a profession; these include cognitive, technical and methodological skills, many of which are acquired at previous educational levels (e.g., the appropriate use of oral, written and mathematical languages). The basic competencies, into the curriculum, incorporation requires considering what the fundamental learnings are. All students must acquire the fundamental learnings in each of the stages, areas and subjects and establish the necessary priorities among them. These



competencies are the ones that are being evaluated at the high school level, using the PISA test.

Generic or cross-cutting competences have been defined as the attributes what a university student should have, regardless of his/her profession. They can collect generic aspects of knowledge, skills and values that any graduate must have before entering the labor market. These competencies are the common basis of the profession or refer to the specific situations of professional practice that require complex responses. Generic competences are those that have not only a technical component, but also an essentially human one. They are the skills, values and resources that we all have, simply because we are human, and that we therefore, put at stake in the areas where we develop.

Finally, the specific competences are the particular basis of the professional exercise and are linked to specific conditions of implementation. Unlike generic competencies, specific competencies have been defined as the attributes that future graduates must acquire, during their stay at university, and must be defined by the experience of graduates. The specific competencies have been divided into two major groups: those related to the disciplinary training, to be acquired by graduates, called Academic Discipline Skills, and those related to vocational training, that must be acquired by future graduates and they are also called professional competences [2].

1.2. - Values and education.

Ethics is always for difficult times. Nothing happens when things go well, when everything smiles at us, when situations are of abundance. If there's plenty of water or food, nobody cares about sharing it. The problem with sharing is when something is missing. When everything is harmony and nothing needs to be explained, there is no need for ethics. Ethics, values, the need to reflect on a shared human project, arises in times of difficulty. What happens is that for humans, the moments of adversity, occur during our whole life and almost any time, because we are always in dilemma.

To the question of why to teach ethics in this world? Why teach solidarity or respect to others in a world where there is no solidarity? That is precisely why values must be taught! If everyone in the world was tolerant, fraternal, respectful, there would be nothing to teach. But because that's not the case, as in the world the examples that abound are negative, ethics and ethical effort make sense. What is the point of teaching: values, ethical principles, patterns of life to young people who are going to have to live in a world where crimes, lies, corruption, wars, violence abound? What is the point of ethically preparing them for an

unethical world? What should we do? Prepare them to be more corrupt, more criminal, more exploitative, more violent than others?

Precisely because the world as a whole is unethical, it is why people must be ethically prepared; precisely because the world is not what we would like it to be, we should try to instill ideals of transformation and reform in young people. If the world were a perfect, idyllic place, where human beings lived fraternally and did not take advantage of each other, or exercise violence in their relationships, ethics should not be taught. Precisely because the world is not what we have to reflect on the values and the type of attitude and conduct we want. In today's world, it is increasingly necessary for engineers to be sure to make the right ethical decisions, during the exercise of their profession. But any ethical decision is based on the values that the individual possess. Values that are like the compass that guides your life and actions [7] The university is a state-of-the-art scientific center and also for the scientific values conservation. The aim of the university is to train professionals and researchers, and to research to go beyond what is known as well as spreading acquired knowledge.

In science itself there are ethical values, values that a scientist needs, for example, truthfulness, the objective and sincere search for truth. This is both a moral and scientific value. Other moral values, but also scientific ones are, for example, respect for the work of others, cooperation, loyalty with collaborators, and of course, within the relationship teachers students, objectivity, impartiality in the assessment of the work of students, respect for their creativity, self-education, because as Sabater says[8], the role of teachers is to teach others to do without us.

However, if we are going to evaluate an action a behavior or a conduct? We first have to agree on what a value is, what is value? What are its characteristics? What is its hierarchy, how to recognize a moral value? We are stepping on the grounds of a philosophical branch that has recently been detached with a lot of boom; it is the Axiology (treatment of values), cultivated in the twentieth century by authors such as Max Scheler [9] and Nicolai Hartmann. According to Max Scheeler, value is not a thing, but something that adheres to things and is therefore a quality. The values, according to that philosopher are independent of quantity, time and space. When a thing is beautiful, or an act is generous, it is regardless of space, time, and number. [9]

On the other hand, the values seem to be always the same in all places. There are no people on Earth whether civilized or primitive, modern or ancient in



which sickness is preferred over health, or where cowardice prefers courage, nor in which greed is preferred to generosity or betrayal is preferred to loyalty and this happens because values are at the service of life.

2. VALUES AND EDUCATION

Today, many educators believe that values can also be taught as part of the skills that human beings must acquire, in order to function in a more just and supportive society. This teaching is given at home, at work, at school, with friends, traveling, etc. The teaching of knowledge and skills, is currently given in universities and technology directly, while that of attitudes and values indirectly^[10]. What are the values that a chemical engineer should have?

Of course, chemical engineers must have vital values.^[10] Health is very important, without it no one can properly perform his/her functions^[11]. Agility and dexterity are also desirable goods that can be acquired through healthy eating, the practice of sports and temperance in eating and drinking.

It is obvious that chemical engineers must have economic values, as they will work in companies that must be economically affordable. Therefore, emphasis should be placed on the values of utility, quality, economics, success, productivity, savings.

Among the technical values, that the chemical engineer must possess, are: calculation skills, love -for studying, the desire to keep learning, organization, diligence at work, creativity, responsibility, pragmatism oriented towards the development of products and services and last but not least Sensitivity to social problems.

Among the intellectual values that chemical engineers must cultivate are: wisdom, scientific and technical knowledge, love for truth, development of intellect, innovative mindset. Flexibility of criteria, adaptability, entrepreneurial attitude and sensitivity to social problems.

Social values are very important for the chemical engineer. Among the values he must cultivate are: sensitivity to social problems, kindness, honesty, spirit of service, solidarity with workers, colleagues, entrepreneurs and authorities. Patriotism, cooperation and social cohesion, prosperity, prestige, authority, awareness of sustainable development, leadership and respect for authority.

Chemical engineers should also practice the aesthetic values that signify the love for the well done, for the beautiful, for the good looks and presentation, the love for ecology, the awareness of the use and preservation of natural resources.

Moral values make the chemical engineer more perfect as a professional and as a human being. The engineer should be cautious in his/her decisions, fair to colleagues and junior fellows, tempered in his/her desires, courageous in decision-making and during adversity.

Finally, theological values should not be disregarded, whether the engineer is a believer or not, to progress in his/her career ~~you~~ faith is need in people and undertaken projects, hope in achieving the results and that the actions will produce a better world for themselves and humanity, charity and solidarity, with those who have less and with those who know less.

Unfortunately in our times the lost of the values have produce a civilization based in greed and force. In many countries the violence, the vice and the inequality are the norm. Even the education have lost the power to transform the values of the students, because the governments have neglected the practice and teaching of values.

The lack of values in Mexican society has led to large-scale corruption, both governmental and private, and has led to the creation of the drug cartels that ravages the country. This has certainly impacted the petrochemical and chemical industry.

3. CONCLUSIONS

Graduates in Mexico are more or less well prepared in the aspects of science and technology (knowledge) and during the studies they receive a good training in so-called skills. But how much are they trained in the field of attitudes and values? To alleviate the deficiencies existing in this line, for some time, the so-called socio-humanistic courses, have been imparted in the curriculum, which should have an impact on the fields of knowledge, skills and especially attitudes.

It is rightly said that values can only be taught by example, but it is necessary that in addition to example there should be information regarding what are considered good or acceptable values and attitudes to society. For example, one can improve the attitude towards music by publicizing it, but also by receiving information about it and the same goes for justice, civic values, truth, honesty. In Mexico, connoisseurs and the government see that there is a crisis of values since corruption, lies and crime and inequality are part of our daily life; thus, more emphasis should be placed on the teaching of values such as honesty, solidarity, social justice, health and life.

Unfortunately, these last topics have been neglected for decades. Media, films, radio, and television stations and social media insist on spreading the philosophy of the ugly, the absurd, vice,



unhappiness, dishonesty, betrayal, in short, the culture of death. In order to remove the country from the crisis in which it is located, the education in competences as knowledge and skills is not enough, emphasis must also be placed on the acquisition of positive values and attitudes. This should certainly begin in the homes, in elementary, secondary and high schools and continue in universities.

The author believes that the teaching of essential values should not be given through the inclusion of more and more courses, in the already tight university curriculum, but through the so-called cross-cutting curriculum, that is to say, emphasizing each and every one of the subjects, and highlighting the need for ethical behavior, that makes us better and that benefits all the inhabitants and the country itself.

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