TECHNOLOGY EDUCATION FOR THE FUTURE: FROM SIMPLE GROWTH TO SUSTAINABLE QUALITY OF LIVING

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Abstract *— Technology Education for the Future: from simple Growth to Sustainable Quality of Living leads to the notion that it means the search for ways to provide significant information and content, which can serve the future professional to perform in order to promote the development of science and technology for human welfare. A deeper understanding about life and future generations education means a truly sustainable technological use for a practice that is evolving, diverse and dynamic. It supports the education in a level that promote quality of life of present and future generations within the limits of social and natural systems. ICECE - International Conference on Engineering and Computer Education is a conference that for almost 15 years has been providing a breeding soil for discussions and solutions for engineering and computer education worldwide. This paper aims to describe the evolution of ICECE recognized as a global congress.*

Index Terms — global; innovation; International Education; sustainable growth.

INTRODUCTION

This new global reality clearly redefined the role that education must play in preparing all future professionals for success. Many countries have been investing a lot of resources in education, betting in its transformation to prepare students for the rigors of a global economy. It is clear that it is important to set clearer, higher standards, prepare more productive teachers, and provide effective knowledge and tools for a future performance. It is imperative to prepare the young population for the future educating them for global competences [1].

This new global reality clearly redefined the role that education must play in preparing all future professionals for success. Many countries have been investing a lot of resources in education, betting in its transformation to prepare students for the rigors of a global economy. It is clear that it is important to set clearer, higher standards, prepare more productive teachers, and provide effective knowledge and tools for a future performance.

To be global competent means being aware, curious, and interested in learning about the world and how it works; to be curious, ask and explore critical questions and "researchable" and are systematically engaged intellectually and emotionally. From analysis to synthesis to evaluation, it is important to weigh and integrate evidence to create a coherent response that considers multiple perspectives and draws defensible conclusions no matter if it is an essay, a problem or design solution, a scientific explanation or a work of art.

Globally competent professional understand that audiences can differ on the basis of culture, geography, faith, ideology, wealth, and other factors and that they may perceive different meanings from the same information. They can effectively communicate, verbally and non-verbally, with diverse audiences as well as choose and effectively use appropriate technology and media to communicate with diverse audiences, including through respectful online social networking. In short, they must be technology and media literate within a global communications environment.

These facts lead to the need of reforms in education, not only in industrialized countries as well as in developing countries. In Europe reforms are also related to financial support from public funds. In United States “lessening time to degree is discussed more in terms of institutional accountability: students should not be kept for years within an overspecialized doctoral program because of their value as a research assistant to their major professor”.

In many countries reforms are motivated by the belief that universities could be the engines of economic growth through research and innovation leading to high technology products. So, all the reforms are focused on establishing quality graduate schools, building university facilities and research infrastructure, and acquiring highly trained S&E professors, either at home or abroad.

In other countries, such as Japan industry’s growing interest in graduate education takes the form of increasing support for university-based research. Changing education practices in Japan, which places greater emphasis on course-based doctoral degrees, as opposed to career-based degrees means that such support is increasingly related to graduate education.

Institutions of higher education principally in technology and engineering in the 20th century became places to learn job skills rather than receive a traditional liberal education. The traditional liberal education involved

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learning both the received tradition and the critical thinking required to transcend it. It involved skills for personal self-management and citizenship–the direction of government through active participation, especially at local levels of society. While job skills are important to put food on the table, they are not adequate for living a good life.

This world educational scenario needs more than ever formation of good engineers and professionals in technological fields is fundamental for the governments, the industries and the societies. It is fundamental from simple Growth to Sustainable Quality of Living.

In a partnership with IEEE – Education Society the International Conference on Engineering and Computer Education - ICECE'2015 takes place in Žilina, Slovak.

The theme of the congress is: "Technology Education for the Future: from simple Growth to Sustainable Quality of Living ". Using this platform it aims to continue the success of past congresses in supporting the dissemination of quality research and to provide memorable experience through the hospitality, location and congress facilities.

ŽILINA, SLOVAKIA

In Žilina St. Mary's Square the attraction is that from each of its corners project a pair of streets – two of them being sheltered? If you choose the former Golden Lane – the covered Hodžova Street (Hodžova ulica), you will get to the Church of St. Barbara, which is renowned for its valuable baroque interior. It is interesting that the church has two organs (small and large). Both were made by the famous organ builder Peregrín Werner. Opposite the church, on the corner is Bacher's villa, where from December 12, 1918 – February 2, 1919, the "first Slovak government" was seated. Žilina then became the capital of Slovakia for two months [2].

FIGURE. 1
ŽILINA, SLOVAKIA

Taking another street (Sládkovičova ulica), which leads out of the square, is the building of the former Neologic Synagogue, designed by the important Berlin architect Peter Behrens. Opposite the synagogue is the unique palace probably seen somewhere else. It is a reduced replica of the Vienna Belvedere Palace – the Rosenfeld´s Palace. Taking another street from the square, J. Vuruma Street (ulica J. Vuruma), in its center is located the House of Arts Fatra (Grand Bio Universum). In 1922, the national premiere of the first Slovak film "Jánošík" was shown.

At the Burian's interspace (Burianova medzierka) - which in the past was among the town's narrowest streets – and to Burian's Tower, which is the belfry of the adjacent church. It is reminiscent of famous Italian city belfries – campaniles. The Church of the Holy Trinity is one of the most important buildings in the town. It is likely that in its close vicinity, a castle stood in the 13th century, which is actually documented, in existing literature, from 1318 to 1454. In 1610, the Žilina Synod, the most important event of Reformation.

Looking at Žilina from a bird's eye view, it is possible to find that it lies in the northwest of Slovakia, in the Žilina.

Basin, at the confluence of three rivers – the Váh, the Kysuca and the Rajčianka. Since the early Middle Ages (the territory of the town was first documented in 1208), Žilina had all the prerequisites to become the metropolis of northwestern Slovakia. Thanks to a convenient location – at the crossroads of trade routes – Žilina has always been linked with development of trade and industry and so it is today: Žilina is a dynamically developing modern town, where a friendly atmosphere, full of colors and aromas will impress you immediately. In short, it is a vibrant town.

Visiting Žilina, it is possible to see its uniqueness and the town center does not occupy a large area. It is possible to get from one end to the other in a few minutes and still have time left to enjoy the atmosphere in the streets, the stylish cafés, restaurants and teahouses.

THE UNIVERSITY OF ŽILINA

FIGURE. 2
LOGO OF UNIVERSITY OF ŽILINA

The University of Žilina was established on October 1, 1953 as the University of Railway Transport in Prague. In 1959 the institution changed its name to the University of Transport and moved to Žilina. As a result of the increasing role of communications within the curriculum and research orientation of the University, the name was amended to the University of Transport and Communications in 1980 [3].

Following wide-ranging changes at the beginning of the nineties, it was renamed again to the University of Žilina pursuant to the law passed by the Slovak National Council on November 20, 1996. This change reflected the University's educational restructuring, which is based on effective theoretical and professional preparation, communications skills, use of information telecommunication technologies, marketing, economics and law emphasizing the future demands of customers. The University of Žilina is the only university located in the northwest region of the Slovak Republic. In terms of professional profile, the University is unique in Slovakia as it has a long tradition of providing education in the fields of transport and communications. Furthermore, during the last period of development the University became an educational institution with a broad profile in many areas of science, technology, economics, management, and recently, educational and natural sciences. The University enjoys a very close co-operation with transport, telecommunication and industrial companies as well as public and private institutions across the region and country. Further, the University contributes to the technological and operational development of transport and telecommunication systems, networks and services as the main conditions for the future economic, and the social development of the Slovak Republic.

FIGURE. 3
UNIVERSITY OF ŽILINA

The University's basic engineer's degree course (corresponds to the MSc. Title) takes five years while a postgraduate program takes three to four years and leads to a doctoral degree. Some fields offer a bachelor's degree course that takes three years. Finally, all of the University's faculties provide a supplementary course of pedagogical studies for students and graduates. Over the last 47 years more than 30 000 students have graduated from the University, to 730 of them have been awarded PhD. Degree.

ICECE'S HISTORY

In 1998 INTERTECH - International Conference on Engineering and Technology Education happened in Brazil, in the city of Rio de Janeiro. Due to the success of the conference IEEE-Education Society by an initiative of its President at that time, Prof. Victor Shultz ICECE - International Conference on Engineering and Computer Education was created and its first edition was in Brazil, also in the city of Rio de Janeiro, in 1999. ICECE was born then as an IEEE-Education Society Conference and since its very first edition ICECE has counted not only with the technical cooperation of IEEE-EdSoc but also with the support of many international organizations.

In the beginning the idea was to have an annual edition of the conference however as COPEC became the organizer of ICECE and as INTERTECH happened in even years the council decided to organize ICECE biannually in odd years.

It has been so far a great success and has counted with the participation of researchers from the six continents of the globe.

THE EDITIONS OF ICECE

The I International Conference on Engineering and Computer Education – ICECE'99, happened in Rio de Janeiro in Brazil, on August 11 - 14, 1999. The theme of the congress was: "Technology-Based Education and Globalization".

The II International Conference on Engineering and Computer Education ICECE'2000 happened in São Paulo, capital of São Paulo State in Brazil, on August 27 to 30, 2000. The theme of the congress was: "Cooperative Network for Engineering and Computer Education Development".

The III International Conference on Engineering and Computer Education – ICECE'2003, happened in São Vicente and Santos, seashore of São Paulo State in Brazil, on March 16 to 19, 2003. The theme of the congress was: "Engineering Education in the World of no Frontiers".

The IV International Conference on Engineering and Computer Education – ICECE'2005, happened in Madrid, Spain, on November 13 to 16, 2005. The theme of the congress was: "Building a Common Space for the Education of Engineers".

The V International Conference on Engineering and Computer Education – ICECE'2007, happened in Mongaguá and Santos, seashore of São Paulo State in Brazil, on March 11 to 14, 2007. The theme of the congress was: "The always noble mission of the education: to work for the future".

The VI International Conference on Engineering and Computer Education – ICECE'2009, happened in Buenos Aires capital of Argentina, on March 08 to 11, 2009. The theme of the congress was: "Educating Engineers for Innovation".

The VII International Conference on Engineering and Computer Education – ICECE'2011 happened in Guimarães, the cradle of Portugal on September 25 -28, 2011. The theme of the congress was "Engineering Education Inspiring the Next Generation of Engineers".

The VIII International Conference on Engineering and Computer Education – ICECE'2013 happened in Luanda, the capital city of Angola, on March 3 to 6, 2013. The theme

of the congress was "Forming Engineers for a Growing Demand".

COPEC has organized many congresses since the decade of 90's: 9 ICECE [4-7], 13 INTERTECH (organizing the 14th. Edition) [8-11], 14 SHEWC (organizing the 15th. Edition) [12-25], 8 editions of WCCA (organizing the 9th. Edition) [26-33], 1 WCSEIT (organizing the 2th. Edition) [34], 1 IGIP [35], 1 WCCSETE [36], 1 GCMM [37], 1 WCETE and 1 GCETE.

COPEC: Science and Education Research Council

COPEC - Science and Education Research Council has been very active and has developed many achievements of great importance for the world since its foundation.

FIGURE. 4
LOGO OF SCIENCE AND EDUCATION RESEARCH COUNCIL - COPEC

Its History started with an idea shared by some scientists of creating an organization to foster the research mainly in sciences and education. This idea seized proportions and after some meetings the Council became reality. It is a group of scientists, professors and professionals whose vision of future has driven them to start this work.

It is an organization constituted by scientists of the several areas of human knowledge committed with education and the development of science and technology. Its members believe that education is the main beam in the construction of a better society and that sciences and technology are the big agents in the fostering of progress to promote the welfare of human being.

The main mission of COPEC is to promote the progress of science and technology for the welfare of the humanity [38].

Constitute powers of the institution:

- General Assembly;
- Deliberative Council;
- Board of Directors;
- Fiscal Council.

Through its activities COPEC maintains relations among universities, institutions of education, enterprises and the society of the several countries for the discussion of sciences, technology and education directions. It works to stimulate and to foster the efforts to bring an international perspective in education.

The aims of COPEC are:

1. To promote an apprenticeship community and the development of education and sciences areas constituting in an intelligent way of collective knowledge for the integration with social and economic agents of community;
2. To establish and maintain the exchange among institutions, educators of educational institutions in several countries worldwide;
3. To stimulate and to foster the efforts to bring an international perspective in education to face the global world challenges.

The council plans to accomplish its goals by means of:

1. Currents Conferences;
2. Planning segmented and united actions among schools for the development of projects of internal and external community interests;
3. Interchange programs; Projects and researches of supporting;
4. To work for the creation of conditions and the means for updating, development and the permanent re-qualification of professionals of the several areas of human knowledge;
5. And other means appointed by the Council or by an authorized organ.

Presently in national scenario it plays an important role once it has been working to foster the discussions and the implementations of policies for the betterment of research in the several fields.

ICECE'2015

ICECE'2015 is an event that has been organized with the goal to provide the best environment for discussions and experience exchange among teachers, researchers and professionals of engineering and computer sciences who work for the enhancement of education.

- Key note speakers: specialists will be speaking about their area of expertise and will answer questions of the audience;
- Round Tables and Panels: A meeting with invited specialists to debate with the audience themes that are important for engineering and technology education;
- Technical Sessions: professionals and researchers will be presenting papers of relevance, specially selected by the international committee. These papers present the top researches and experiences;
- The Open Session: It counts with the presence of conference organizers, members of the committee as well as participants and authorities of the host cities and University;
- During the event attendees can participate of cultural and social activities specially organized for the conference.

Planning

The planning for the organization of an event comprehends a number of activities developed in phases that requires

human resources and material, which works are the result of a lot of efforts and dedication. The development of the activities has 4 phases:

-1st - Conception of the Project ICECE'2015, in this phase there were discussions about the estimate date, necessary resources, establishment of goals and the elaboration of the Project.

-2nd - Pre-Event that involves the establishment of the necessary activities for the accomplishment of the event:

Operational team;
Basic Budget;
Basic Chronogram;
Services to be hired;
Establishment of organogram.

-3rd - Event, which is the accomplishment of the Project taking into account the realities that present at the moment. It is the conference happening with all the activities that are necessary to develop during this phase that are basically the reception of attendees, accompaniment of all the sessions.

-4th - After the event when the conference finishes a report is made with all the information about the conference and send to the Council, to be in the databases of the organization, to the Foment Agencies and etc.

COPEC team has around 4 people working directly and exclusively to accomplish ICECE'2015 plus 3 others for some time, 5 days per week, 6 hours per day. During the conference more people is hired for reception and technical issues as well as transportation, feeding, cultural activities and others when they are necessary.

COPEC team has:

- widely spread call for papers, electronically and folders;
- advertisements in international Journals;
- made and maintained the homepage;
- managed the reception and reviewing process of papers;
- as well as organized the cultural and social activities of the conference.

It took twelve months of hard work and dedication.

PUBLICATIONS

ICECE'2015 publishes electronically a collection of papers that were peer reviewed and approved by the Technical Program Committee; additionally, a book of abstracts is published containing general information on the Congress and the abstracts of all presented works as well as the Congress Proceedings registered at the National Library and they possess ISBN with international validity; besides, the proceedings have ISSN because they are also a periodic.

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FINAL COMMENTS

The crucial aspect of this very successful international congress is that it not only provides the educators with a high quality scientific meeting but also promotes the understanding of some aspects of engineering and computer education so important at the present time of economical and social conflicts.

Every year it is possible to say that ICECE is certainly a successful congress exceeding the expectations once it brings together researchers from many countries and it is not different for ICECE2015. This edition brought discussions and projects that enlighten the engineering and computer science education globally and which outcomes can be pointed out as: the need to promote the professionals in engineering to the stature and influence to law and medicine; to redefine the nature of basic and applied engineering research; to emphasize the broad knowledge necessary to understand the impact of engineering and computer solutions in a global and societal context; to achieve far greater diversity among the participants in engineering and the programs engaged in preparing them for professional practice; to be aware of contemporary issues and the ability to use the techniques, skills, and modern engineering and computer tools necessary for engineering education practice [39].

ICECE provides for all participants and stakeholders in the engineering community (industry, government, institutions of higher education, professional societies, et. al.) the breeding soil, for discussions and solutions necessary to enable participation in engineering to achieve a racial, ethnic, and gender diversity consistent with the world population.

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