

Towards a New Language in Engineering Education

Author:

Patrick Rombauts, Vrije Universiteit Brussel, IR-ETEC-ARCH, Pleinlaan 2, B-1050 Brussels, Belgium, prombaut@vub.ac.be

Abstract – An education innovation project has been finished : “Flexible and competence based learning in a laptop room”, Subproject “Criteria optimising the learning conditions in flexible ICT environments” where the disciplines Visual Ergonomics, Lighting, Building functions, Safety, Health and Teaching methodology and e-Learning meet. “Sustainable School Buildings” is today our principal theme with in particular “Rational Use of Energy” and “Visual Performance and Comfort”.

A University Development Cooperation project “Enlighting Colombia : Education, Research and Services on Light and Lighting” at the “UNAL-Universidad Nacional de Colombia sede Bogotá” is illustrating the goal of sustainable development by activating local stakeholders as universities and industries. By way of this “Specialisation in Lighting” at Postgraduate level other secondary elements as the quality of life in the concerned global society are amazingly realised (at first sight components not directly related to these).

A common English Masters of Science in Engineering will be organised starting from the academical year 2011 on by the ULB-Université Libre de Bruxelles (the French speaking Brussels University) and the VUB-Vrije Universiteit Brussel (the Dutch speaking Brussels University) and are covering each precisely the half of the complete “English” cake, and are making it so a perfect match and balance between three languages : English, French and Dutch.

“Language” too is obviously playing an extremely pertinent role in every component of educational set-up, even in technological or technical matter. Our statement is to bring up this spirit to life through permanently putting the language and communication concepts as the basis for every layer.

Besides, common English Masters of Science in Engineering will be organised starting from the academical year 2011 on by the ULB-Université Libre de Bruxelles (the French speaking Brussels University) and the VUB-Vrije Universiteit Brussel (the Dutch speaking Brussels University) and are covering each precisely the half of the complete “English” cake, and are making it so a perfect match and balance between three languages : English, French and Dutch.

Index Terms – Engineering Education, Research and Society, Sustainable Development

INTRODUCTION

Engineering Education is becoming more and more competence based within a project oriented and problem based learning context. A holistic approach is becoming herewith clearly visible as a central pinpoint in the curriculum of the engineering sciences.

New education and learning tools are being implemented intensively and courses are being reoriented towards more self-employed didactics (a.o. simulations).

An education innovation project has been finished : “Flexible and competence based learning in a laptop room”, Subproject “Criteria optimising the learning conditions in flexible ICT environments” where the disciplines Visual Ergonomics, Lighting, Building functions, Safety, Health and Teaching methodology and e-Learning meet [1].

“Sustainable School Buildings” is today our principal theme with in particular “Rational Use of Energy” and “Visual Performance and Comfort”.

Lighting, and what is more important, daylighting, is used to create this environment and context.

The importance of daylight in a human and learning environment can never be underestimated !

TECHNOLOGY ON THE SCHOOL

In “Teacher Education”, maximising the active role of technology in basic courses as mathematics, physics and chemistry should be the main objective.

By means of the introduction of “Technology on the School-TOS21” by the Flemish Ministry of Education and the so-called *WiiR* “*Wiskunde-Ingenieur*” Mathematics/Engineering projects within the KA-Etterbeek secondary school in Brussels, the pure science “Mathematics” can be expanded over a wide range by letting the pupils participate in research laboratory “outside” the school and where they can elaborate laboratory sessions of “Technology”.

By constantly starting the application from within the proper living world of the students and pupils themselves, attention and motivation are very much enhanced.

THE “ENLIGHTENING COLOMBIA : EDUCATION, RESEARCH AND SERVICES ON LIGHT AND LIGHTING” PROJECT

Electrical energy is a scarce resource and lighting – which is a key element in developing a secure society consumes too much of this resource. Furthermore, Colombia has insufficient specialist knowledge on light and energy-efficient lighting, for instance to implement the new regulations on lighting in public buildings.

The overall project objective is to set up sustainable education, research and service capabilities related to light and lighting in Colombia. To build such capacity, the project will concentrate on *teaching* (via a postgraduate course on light and lighting, partially based on the opportunity offered by an industrial-grade lighting laboratory at UNAL) and teaching its teachers. It will establish a *research programme* in lighting based on PhD student exchanges on joint projects, (leading to reduced lighting energy consumption for the region) to enable the laboratory to provide services to the Colombian stakeholders, finally realising a sustained *interaction* and cooperation between UNAL (Jesús Maria Quintero Quintero and Fernando Herrera), the laboratory, industry and Belgian universities.

In Colombia there is a yearly growth rate estimation of the population for the following years of 1.8%. Energy consumption follows population growth. Taking into account an economic growth of 4% after inflation, also entailing energy demand, the total electricity demand will shortly exceed supply, with the likely consequence of power failures. Indeed, today's electricity generation capacity of 13.6 GW is covering ~90% of the population, meaning that there is already a shortage of about 10%. Hence, energy saving and energy efficiency is a serious concern for the Colombian authorities; new lighting developments can play an important role in this (typically 20% of electrical energy consumption comes from lighting – providing a large potential for energy savings).

In this context, Colombian government decided to ban the use of incandescent light bulbs in two phases, first in all official, public and related buildings, then in all sites, and replace them by energy-saving Compact Fluorescent Lamps by 2009.

Obviously, this caused a flow of questions and requests from all sectors of society, with a pivotal role played by the university to ensure deployment of optimal lighting solutions. This requires specific competences, underpinned by high-level research at the universities, and a serious lack of experts in this area was revealed. Hence, there is an urgent need to build up an education and research capacity in the field of light and lighting in Colombia.

In 2004, UNAL's electrical engineering department, created a specialization course “Especialización en Iluminación Pública y Privada” in the framework of “El Programa Curricular de Especialización en Calidad de la Energía Eléctrica”. This specialization, for professional electrical engineers, answering a clear demand, focused on developing their knowledge in public and domestic lighting technology, enabling to solve engineering problems in this domain. The success of this basic course for industry proved to respond to a real need. However, it soon appeared that not all required expert knowledge was available, and that the academic resources for this programme are insufficient and of too low level. There is no fundamental research programme. As such, there is a clear need to set up and reinforce education and research capabilities on light and lighting at UNAL, based on a strong Belgian link.

Hence, the UNAL electrical engineering department expressed the request to cooperate in this field, and considering existing links with Belgium, the request was forwarded to Belgian experts of the universities of Leuven, Louvain-La-Neuve and Brussels, and to the university college KaHoSL (Ghent-B). Such research capability needs permanent actualization of knowledge and competences, especially as lighting evolves very fast. E.g. more powerful and efficient light sources (HID-High Intensity Discharge, CFL-Compact Fluorescent Lamp, LED-Light Emitting Diode, ...), creativity for energy saving, increasing importance of safety considerations, weight of international normative requirements, a more acute care than in the past to bring comfort and conviviality through a lighted environment, etc. The link to the Belgian experts will allow the Colombian researchers and lecturers to stay up to date with this evolution and to set up their own research capacity.

Since the 1980's, UNAL is operating a photometry and electricity testing laboratory (originally from the Belgian company Schröder -specialized in design and manufacturing of luminaires- with a seat in Bogotá since 1955). Today, it is not optimally used any more and it previously lost its certification because competent people to perform tests and research are lacking. The proposed project will clearly contribute to solve this problem, and build up the research capacity to make it self-supporting when re-certified. Besides, it is obvious that the presence of this photometry and electricity testing laboratory in Bogotá provides opportunities for research and educational support during as well as after the project.

In August 2008, a three-day so-called PCM-Project Cycle Management Workshop was held in Bogotá. “PCM” is a very comprehensive, clarifying, logical, adequate and universal tool with proper terminology and rules to work out and fill in in detail the planification matrix of a project. Taking into account the results of this PCM workshop, the project has put the best focus on developing a sustainable research capacity (rather performing specific research). During the PCM workshop the problem tree and the logical framework have been defined.

This is illustrating the goal of sustainable development by activating local stakeholders as universities and industries. By way of this “Specialisation in Lighting” at Postgraduate level other secondary elements as the quality of life in the concerned global society are amazingly realised (at first sight components not directly related to these). Much is indebted to Prof. Geert Deconinck of ESAT-KULeuven (Belgium) who largely contributed to the project as a copromotor and who also took the following pictures on the PCM Workshop in Bogotá.



FIGURE 1

WORKING OUT THE PLANIFICATION MATRIX OF THE PROJECT DURING THE PCM-PROJECT CYCLE MANAGEMENT WORKSHOP IN BOGOTÁ (AUGUST 2008)

“Words” and “Language” are in first instance “intuitive tools”, i.e. they can be seen as free or loose expressions of a bubbling up of basic thoughts that are coming up in mind. It starts in fact from a natural, individual, non-imperative theme or launched concept where afterwards people can build on further as a landmark. Examples are f.i. the words “light”, “energy”, “life”, “sustainability”, “future”, “humankind”, etc.

“Language” too is obviously playing an extremely pertinent role in every component of educational set-up [2], even in technological or technical matter. Our statement is to bring up this spirit to life through permanently putting the language and communication concepts as the basis for every layer.

Besides, common English Masters of Science in Engineering will be organised starting from the academical year 2011 on by the ULB-Université Libre de Bruxelles (the French speaking Brussels University) and the VUB-Vrije Universiteit Brussel (the Dutch speaking Brussels University) and are covering each precisely the half of the complete “English” cake, and are making it so a perfect match and balance between three languages : English, French and Dutch.

In this context, Flemish dialect speaking people are actually using around 8000 words on average and on daytime basis, where Dutch speaking people are using around 5000 words on average. It shows the richness of dialects in vocabulary, pronunciation and accent.

REFERENCES

- [1] Derks, T, Rombauts, P, C, Verdonck, A, Vanmeerbeek, K, “Flexible and competence based learning in a laptop room - Subproject Criteria for Optimising the Learning Conditions in Flexible ICT Environments”, *VUB-Vrije Universiteit Brussel-Research Council*, Brussels, Belgium, ADSS 108, 2002
- [2] Liljefors, A, “Redefine the Term Light”, *School of Architecture, Royal Institute of Technology, KTH*, Stockholm, Sweden, 1995