This presentation has three primary objectives:

- Inform you about UNESCO
- Inspire you about UNESCO's work , work that has close connections to engineering
- Influence our actions to create a better future for all of us and the world.

The presentation utilizes primarily images since they are able to convey the sprit and extent of UNESCO's work more succinctly than words.

I will start with some historical background on UNESCO.

The tragedy of World War II led to the conviction that a much stronger base for peace had to be created than was the case in the past.

Unlike in earlier wars, vast civilian populations suffered in World War II.

Peace had to be firmly established, protecting the needs of all citizens and meeting their needs.

The efforts had to go beyond re-construction of damaged buildings, homes , offices, schools, bridges, roads and factories. The efforts had to address the very roots of war and the foundations of peace: respect for human rights and dignity, protection of personal freedoms and the respect for different cultures.

As early as 1943, two years before the end of WWI in Europe, people in government on both sides of the Atlantic and elsewhere turned their minds to this formidable challenge.

UNESCO Constitution (1945)

To meet this challenge, representatives of 44 countries convened in London , England in the Fall of 1945 to draft the constitution of a remarkable new institution (as part of the new United Nations):

> the United Nations Educational , Scientific and Cultural Organization - UNESCO.

By November, basic agreement had been reached and the Governments of the States Parties to this Constitution declared (on behalf of their people):

UNESCO Constitution (1945)

….. that since wars begin in the minds of men, it is in the minds of men that the defenses of peace must be constructed;

….. that the wide diffusion of culture, and the education of humanity for justice and liberty and peace are indispensable to the dignity of man and constitute a sacred duty which all the nations must fulfil in a spirit of mutual assistance and concern;

These are inspiring words, articulating the essential principles of peace.

As a foremost purpose of UNESCO, they stated:

UNESCO Purpose

…... to contribute to peace and security by promoting collaboration among the nations through education, science and culture in order to further universal respect for justice, for the rule of law and for the human rights and fundamental freedoms which are affirmed for the peoples of the world, without distinction of race, sex, language or religion, by the Charter of the United Nations.

Thus a strong link was forged between principles and purpose.

As I reflected on the constitution, written just after the end of WWII, two thoughts struck me:

- The emphasis on human rather than material values. At the end of 1945, it must have been tempting to focus on material issues, most notably reconstruction. I wonder how we would react in our times, times which are so much more focused on material matters.

- The universal, global values of the constitution. While it was undoubtedly forged by the experience of the nations engaged in WWII, its aim was to serve all people, no matter where they lived.

The universality of the constitution was intended to give UNESCO meaning and purpose for both the near- and the long-term future.

Was this indeed achieved?

United Nations
Educational, Scientific and
Cultural Organization

193 Member States,
7 Associate Members

Headquarters:
Paris, France

Director-General:
Irina Bokova

From the 44 initial signatories of the UNESCO constitution in 1946, UNESCO's membership has grown to 193 states, a number comparable to the membership in the United Nations. There are also 7 Associate members, including such territories as the Faroe Islands and the British Virgin Islands. UNESCO is therefore a truly global organization.

National Commissions, such as the Canadian Commission for UNESCO were established, starting in the 1950s. They represent an important link between UNESCO and country-based organizations. In Canada, our commission works in harmony with the Government of Canada but is not part of the Government. It is funded through the Canada Council for the Arts and currently has approximately 400 members to mobilize the participation of Canadian organizations and committed individuals in UNESCO's mandated areas: education, natural and social sciences, culture and communication and information.

UNESCO is head-quartered in Paris, in a beautiful location within sight of the Eiffel Tower. Its architecture and landscape architecture reflect the very best in design and culture from around the world.

UNESCO is led by a Director General, a post currently held by Madame Irina Bokova. She is a distinguished career civil servant from Bulgaria and was elected to the UNESCO post about two years ago.

What is UNESCO 's focus today and what has it accomplished?

While there have been few major, world-wide conflicts since the founding of UNESCO, there are still wars today. Oftentimes they are limited in geographical scope, like the lingering conflict in Dafur, but they still create enormous hardships and tragedies.

Typically, the impact is greatest on the most vulnerable: women, the young, the sick and the elderly.

The fact that armed conflicts continue, often resulting from a violation of the principles embodied in the UNESCO constitution, does not mean that the principles are invalid. It means that the work continues for UNESCO and other United Nations agencies.

UNESCO has a shared responsibility for peace with sister United Nations agencies and organizations, indeed with the United Nations as a whole. It also shares this responsibility with regional organizations, such as the European Union.

While peace is central to UNESCO's work, it also has other priorities, reflecting its full scope in the areas of education, science and culture.

Long-standing UNESCO Priorities

Education

Cultural Diversity

Sustainability

Gender Equality

UNESCO's long standing priorities include education, cultural diversity, sustainability and gender equity. There is also science and technology on which I will comment in more detail later. However, let me draw your attention to one specific initiative right now.

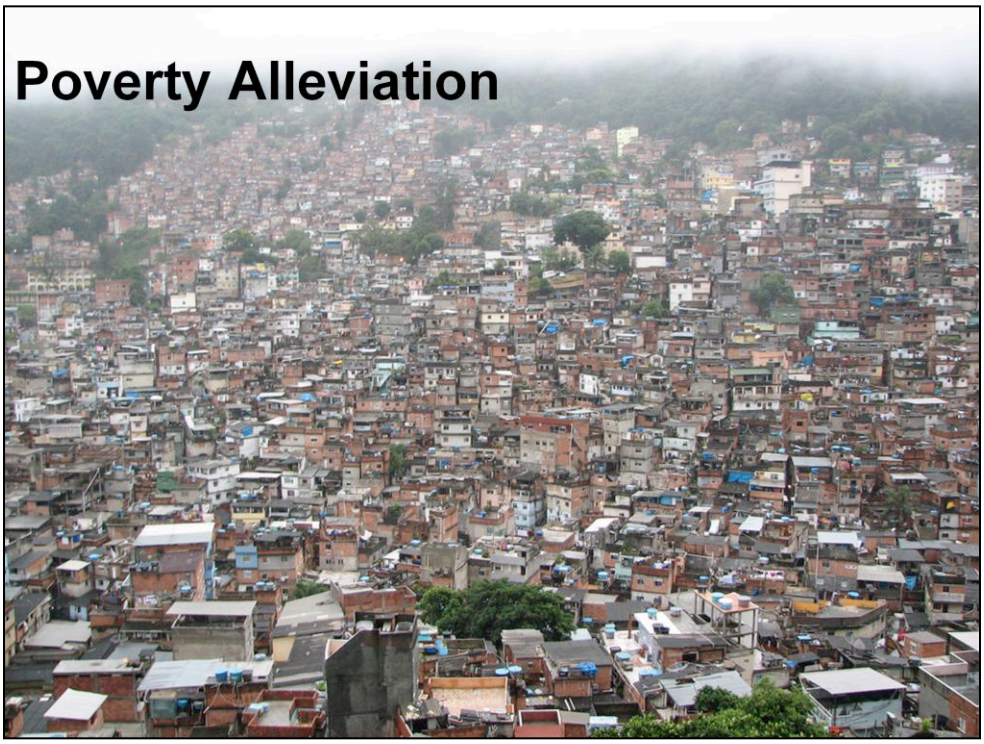
This is UNESCO's commitment to celebrate women scientists. In this endeavour, UNESCO is fortunate to have the financial support of the L'Oreal Foundation.

The image at the top is a celebration of women scientists selected from around the world, while the bottom image recognizes four outstanding young scientists who received their awards in Ottawa last November. The gentleman on the left is the President of L'Oreal Canada.

UNESCO, upon the advice of its members, identified two current major priorities.

The first priority is Africa, a continent in great need of development, yearning for improving the lives for its people.

Africa has a large young population which desires education, jobs and the attributes of civil societies.



The other current priority is “Poverty Alleviation”. Many people around the world are terribly poor, subsisting on less than $1 per day, and often living under abject conditions, especially in urban areas.

Homelessness is a major problem in the developing world, but homelessness also exists in Canada.

With respect to housing, Canada has much work to do, particularly in northern and aboriginal communities.

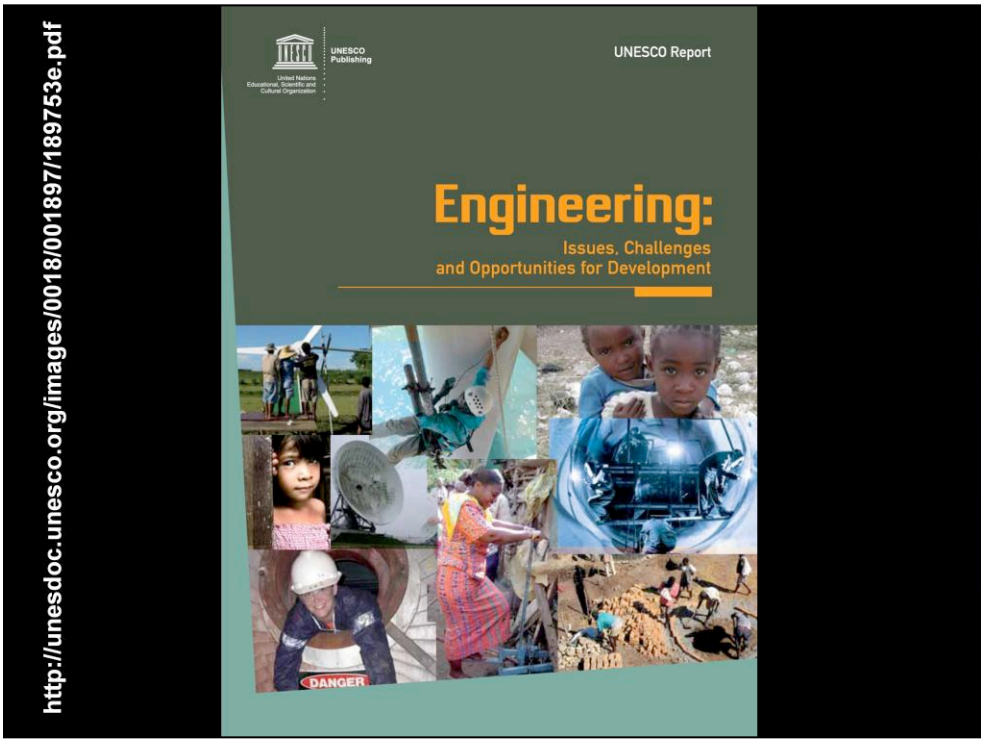
Another example area that UNESCO considers to be essential to a good life is the provision of healthy, affordable foods,

and ensuring conditions that prevent injuries and disease

and, of course, there is a need for clean water and energy.

In all of the examples that I have cited, UNESCO typically works with other UN agencies, governments and the private sector – always focusing on the human basis of the issues and on capacity building – in the areas of education, science, technology and culture.

There is clearly a strong union of interests between UNESCO and engineers. This is one of the reasons why the Canadian Commission of UNESCO is supporting this workshop and my participation.



It is therefore with great pleasure that I can draw your attention to a major report that UNESCO just published on Engineering. It is a multi-author book, with major contributions from Canadians, including Dr. Monique Frize who is leading this workshop.

The report is almost 400 pages in length and I cannot do it justice in my allotted time this monring. Instead, let me focus on a few issues that I consider to be particularly relevant to this workshop and to shaping a better future for all.

The premise that permeates all aspects of the report is that engineering is science and technology in the service of people.

Hence the recognition of the importance of clean drinking water for people in the developed and developing world.

While we may think that we have assured clean drinking water throughout Canada, this is not universally true.

We only need to look at many small rural and aboriginal communities. There is also the emergence of contaminants - such as pharmaceuticals - in drinking water. Even larger cities with good water treatment plants have difficulties coping with emerging contaminants; new technologies are needed.

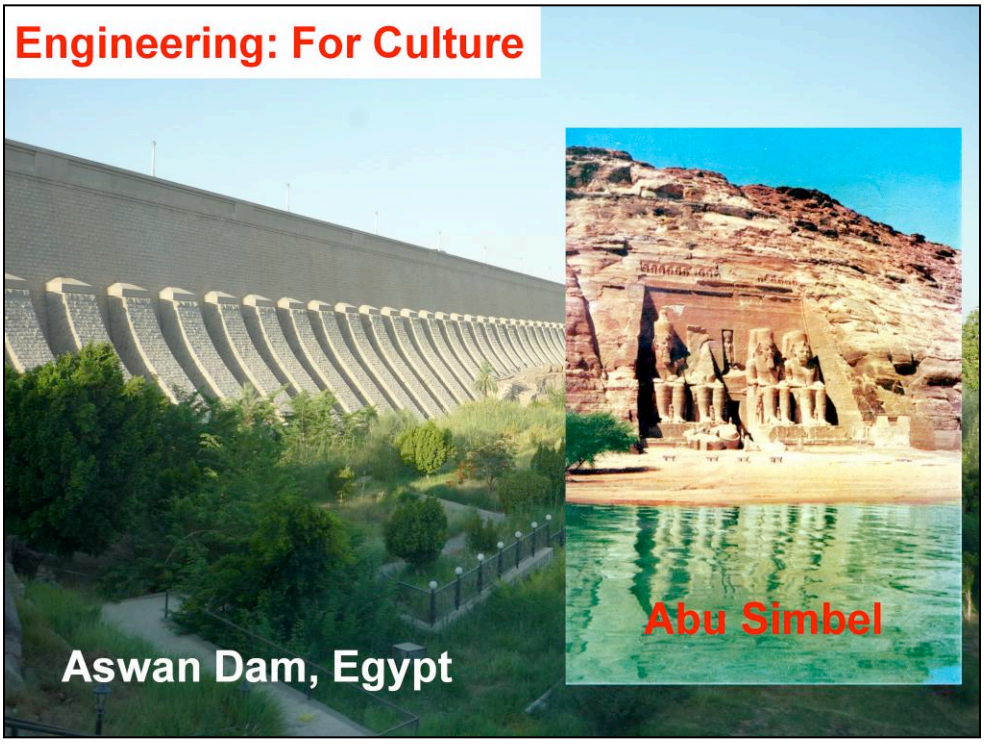
Another area is health care, illustrated here in terms of robotic surgery.

Such surgery is the result of advanced technology developed by engineers in conjunction with health care professionals.

One of the fundamental changes resulting from the work of scientists and engineers is ICT. Digital technologies enable us to communicate and therefore work in entirely different ways from what we were able to do in the past.

Digital technologies are breaking the bond of geography, with people now being able to work far removed from their partners and customers.

Contrary to prevailing thinking, I believe that digital technologies will favour smaller cities, rather than megacities.



Another important aspect of engineering is the development and preservation of culture.

This image depicts the Aswan Dam in Egypt. Its impact on the environment and benefits to society continue to be debated.

What is not an issue is that the construction of the dam and the associated flooding of the land would have submerged the Abu Simble temple complex, a very important cultural heritage site. UNESCO and engineers partnered to move the temple structures to higher ground. This was both an important engineering project as well as a project of cultural preservation.

Engineering: For the Environment

As a final example, let me draw your attention to the environment.

The creation and application of technology are responsible for the environmental degradation that we are witnessing all too often.

However, the solution to these problems also lies, at least in part, in the creation of new, better technologies and the wiser use of such technologies.

To develop better technologies and to guide their use, we depend not only on the engineers who are currently practicing, but also the next generations of engineers.

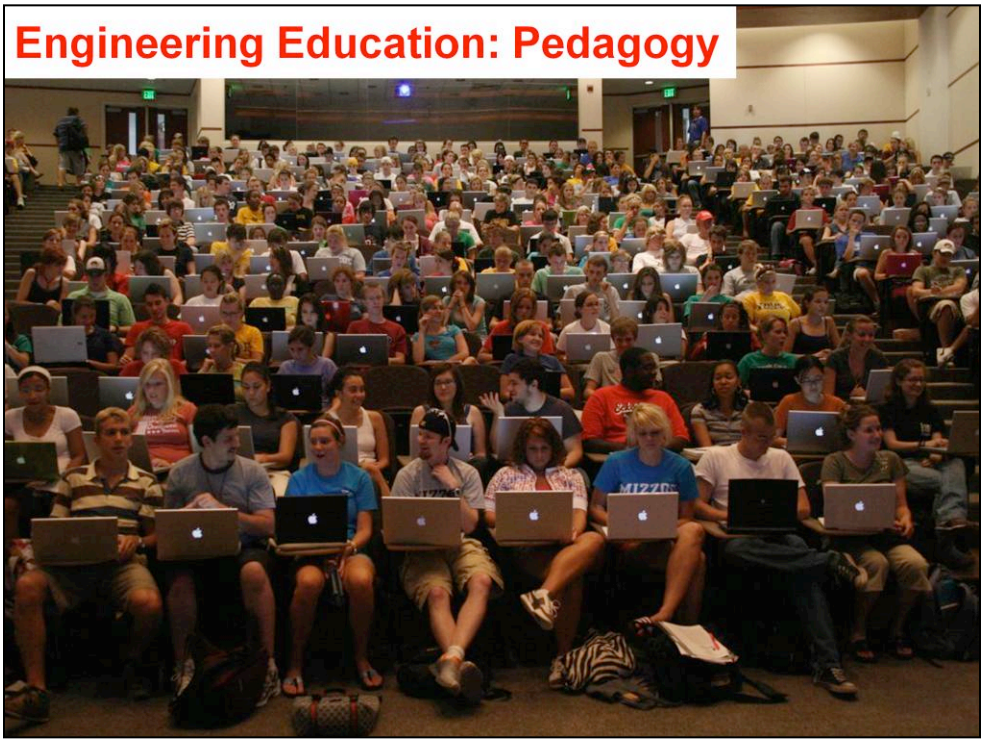
The UNESCO report on engineering therefore devotes considerable attention to engineering education . Let me finish with this topic since it is critical to our future and of central interest to this workshop.

This image conveys one key problem, i.e., the gender imbalance in engineering enrolments. In Canada and in many other countries, the participation of women in engineering education is only about 20%. This represents a great loss of talent and a loss of opportunities for women.

The other problem, signalled by the right side-bar, is enrolment. In many countries, engineering enrolment is stagnating and, in some cases, even declining. It is certainly declining in relation to other fields such as business studies.

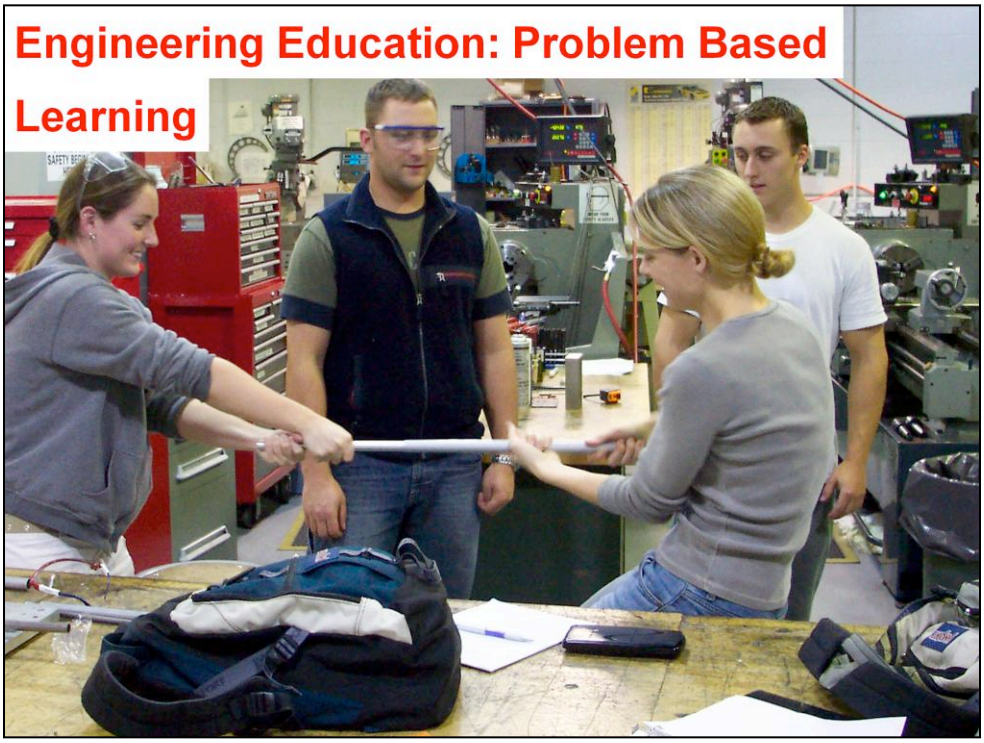
Both the gender imbalance and enrolments represent major losses, which we need to counter and I am glad that this workshop will do so.

Engineering Education: Pedagogy



The report addresses some of the causes for these challenges, with pedagogy and, in particular, typical class-room teaching being one of them.

Even with computers on almost every lap, this is not how most students like to learn.



Hands-on, problem-based learning is seen by most students as a more engaging and attractive form of learning.

Problem-based learning was reinvented a few decades ago for the education of medical students and is now widely practiced in Canada. It has proven to be highly successful in medicine and other health sciences.

However, it is labour intensive and costly.

Engineering Education: Virtual Reality

Emerging alternatives are simulator-based learning and learning in virtual reality.

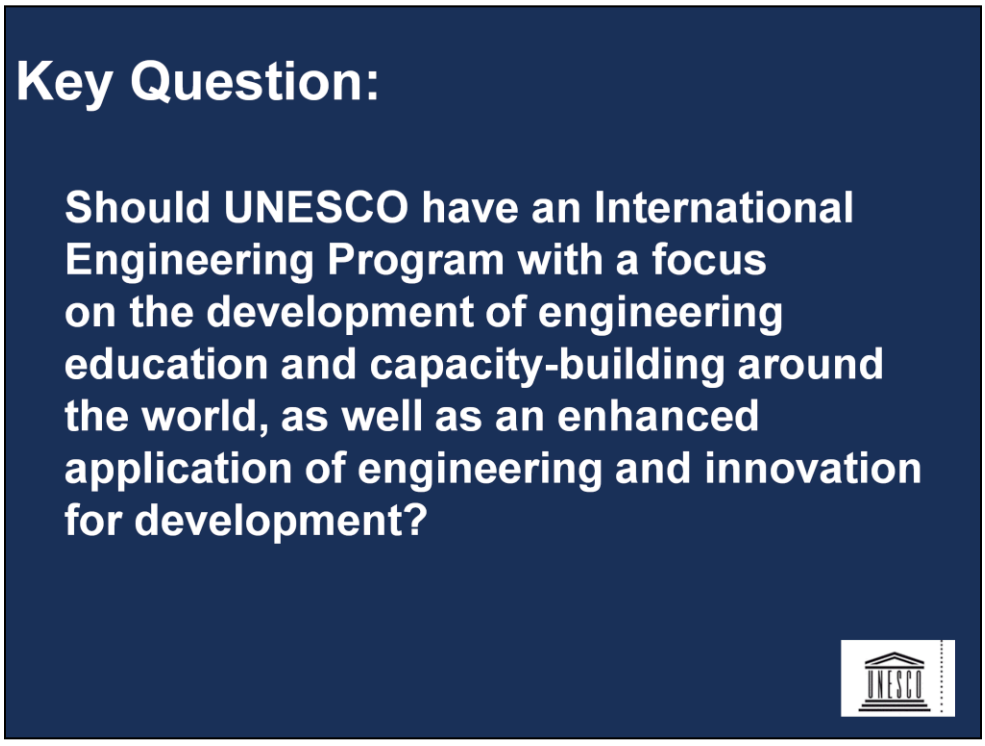
Digital technologies will make these forms of learning increasingly feasible, cost effective and accessible to large numbers of students.

Engineering Education: Professors

A key success factor in engineering education is the professoriate. Most engineering professors are used to and are still most comfortable with the lecture style format.

Ways need to be found that enable them to utilize new simulation and virtual reality technologies.

In my view, the primary issue is not the software or hardware, but the types of learning situations that should be created, especially when we wish to integrate (as we must) the social sciences into engineering education.



Recognizing the central and global importance of engineering education, UNESCO is currently contemplating a proposal to introduce an 'International Engineering Program'. Fundamental questions are:

- Is this a good initiative?
- What would such an initiative include and how would it differ from what UNESCO is already doing?
- Is the initiative a good use of UNESCO's limited resources, especially given many other UNESCO priorities?

Regardless of the answers to these questions and whether or not the International Engineering Program is established, engineering, and engineering education in particular, will profoundly shape all of our futures.

Consequently, there are strong common interests between UNESCO, the engineering profession and engineers. These common interests deserve to be explored and put to good use.