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## Guest Editorial

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*... The World doesn't care about our opinions, or our feelings. The world rewards only those of us who catch on to what's happening, who invest our energy in finding and seizing the opportunities brought about by change.*

From: *New Work Habits for a Radically Changing World.*

This Special Edition of the *Global Journal of Engineering Education* presents important but different facts of engineering education first presented and discussed at the 3<sup>rd</sup> *Global Congress on Engineering Education* held in Glasgow, Scotland, UK. This Congress was sponsored and organised by UICEE with Glasgow Caledonian University (GCU), Glasgow, Scotland, as the host, principal co-sponsor and co-organiser.

This edition reflects the global trends of engineering education that need to be taken into account by engineering educators. The articles discuss key issues for practising engineers to consider in relation to the globalisation of engineering as a discipline.

With the pace of technology rapidly changing, this has significant consequences for engineering educators, industry and commerce. Technology-based knowledge is transient and hence educators of today need to think carefully about curriculum content and educate our engineers for the challenges of tomorrow through providing a portfolio of substantial knowledge skills.

Mary O'Hara-Devereaux and Robert Johansen stated, in *Global Work Bridging Distance, Culture and Time*, that *Constant training, retraining, job-hopping, and even career-hopping will become the norm.*

With the transience of technological knowledge, educators must now prepare engineering graduates with the capability to advance through life-long continuous professional development. Only in this way can graduates update as required and relevant on the latest emerging technologies.

There is now an emphasis on engineers acquiring a range of life skills through the undergraduate curriculum, such as key interpersonal and communication skills. Traditional on-campus learning is no longer the best model for achieving the new developments. However, work-based learning has evolved over the last decade to now provide a way forward for engineers to learn in the workplace environment, both at undergraduate and at postgraduate levels.

Over the last decade at the GCU, work-based learning has been investigated in depth and frameworks put in place to facilitate progression from undergraduate work-based learning through to a postgraduate programme at the professional doctorate level. Prior to the 3<sup>rd</sup> Global Congress, the University's UICEE satellite centre (*Caledonian Centre for Engineering Education*) evolved to become the *Scottish Centre for Work-Based Learning* (SCWBL). The Centre now offers support on a global basis in relation to work-based learning at undergraduate, postgraduate and continuous professional development levels.

Earlier in Glasgow, the scene was set for life-long learning when, in May 1999, the first international conference of the *Caledonian Centre for Engineering Education* was organised to discuss the theme of *Life-long Learning and Continuous Professional Development*. This event was co-sponsored by the UICEE and this conference revealed the increasing importance of life-long learning and continuous professional developments for engineers in highly developed countries, developing countries and those in socio-economic transition.

The sustainability of such developments is at the core of early 21<sup>st</sup> Century thinking with engineering educators being requested to adopt and take forward new learning paradigms; these demand changes in thinking across undergraduate, postgraduate and life-long learning.

Dan Quayle, when he was the US Vice-President, commented that *It's a question of whether we're going to go forward into the future, or past to the back.*

Countries, whether highly developed or in some form of transition, need to be prepared to move away from conventional and traditional learning models if engineering education is to survive. Engineers now work and live in a knowledge-based society and a knowledge driven workplace where knowledge now provides an important competitive advantage. Approaches to engineering education now need to take this rapidly changing workplace and lifeplace environment into account and define learning models that integrate with these changes. Certainly,

education has become a life-long process to support career development in a knowledge driven economy and where much of the explicit knowledge is now transient and the only model that can work is a life-long learning model, which accommodates such knowledge relevance and change. Continuous learning means just that, engineering educators will need to accept that more learning will be achieved off-campus than on-campus in the future. Typically, an engineer needing to acquire language when working in another country can more successfully follow a workplace/lifeplace model to build knowledge of the language rather than attend an on-campus programme.

It is well accepted that often tacit knowledge is more important in companies than explicit knowledge. Tacit knowledge cannot be taught on-campus and hence we need the new learning models that integrate explicit knowledge with tacit knowledge and achieve the learning through an off-campus work-based programme.

Thus, my closing message to engineering educators is to emphasise the need to be forward thinking and accept the need for new models of learning that are underpinned by the current and emerging methodologies, thereby assuring the continuation of high quality education for engineers.

It is important to remember the statement from Warren Bennis, author and distinguished professor of Business Administration at the University of Southern California: *The factory of the future will have only two employees, a man and a dog. The man will be there to feed the dog. The dog will be there to keep the man from touching the equipment.*

**Colin U. Chisholm**